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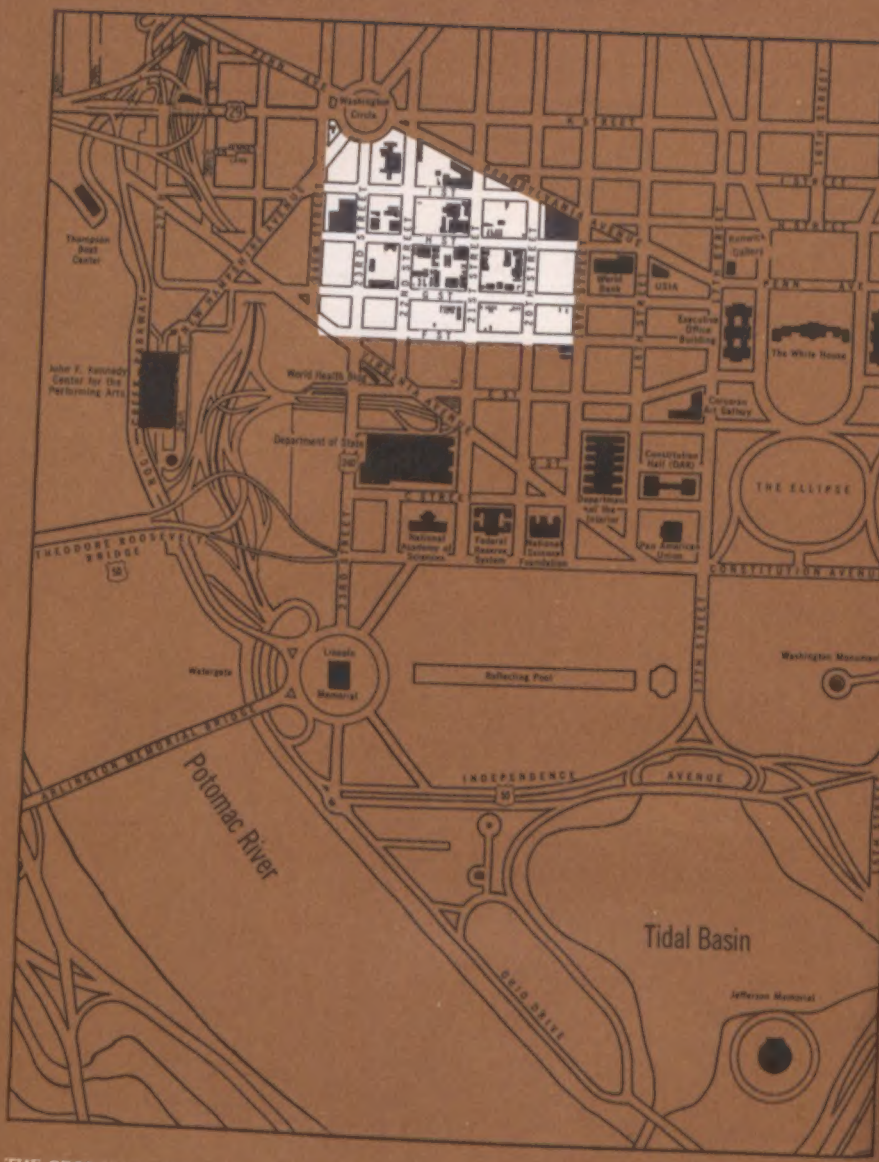
THE GEORGE WASHINGTON UNIVERSITY BULLETIN

VOLUME LXXV, NUMBER 4, MAY 1976



UNDERGRADUATE AND GRADUATE CATALOGUE

1976-1977



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UNDERGRADUATE AND GRADUATE CATALOGUE 1976-77

Arts and Sciences, Education, Government and Business Administration, Public and International Affairs

This catalogue lists the programs and faculties of Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs.

It also contains information on the Division of University Students, in which students may register for University courses for credit or as auditors without pursuing degree programs.

For information concerning the University's programs and faculties in Engineering and Applied Science, Law, and Medicine and Health Sciences request the appropriate catalogue.

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UNIVERSITIES are undergoing change, either drastically or slowly, as they have been for centuries. Whatever the changes, the one premise on which universities are based remains constant: universities are for learning —for acquiring learning, for transmitting learning, and for the exploration that yields new learning. Any other objective is unworthy of a university, and any other purpose is incompatible with the student and his relationship to the institution.

The faculty, through scholarship and research, extends learning, and it transmits learning by teaching. The student learns from the faculty, the library, and the laboratory—if he accepts, as he must accept, learning as his objective. This learning does not take place in a vacuum; in addition to the particular content of learning, the student will develop certain habits of mind—analytical thinking, powers of insight, self-examination, and the use of rational discourse—that will serve him throughout his personal and professional life.

Within this basic context, George Washington University invites the student to take up his residence in order that his energies, interests, and talents may be directed to learning.

Exceptional opportunities for learning are made possible because of the University's location in the heart of the nation's capital. For example, cooperative programs are conducted in various fields of study with members of Congress, the Smithsonian Institution, the Library of Congress, the National Gallery of Art, and other federal and private organizations. In addition to these programs, Washington presents opportunities for observation, study, service, and recreation limited only by the student's time, energy, and imagination.

In this atmosphere, George Washington University seeks to provide a matrix for learning not available in the standard university education, so that no graduate can ever forget that as a student he was at the center of things and that he must forever carry additional responsibility in and for society, because of the opportunity that was his.

LLOYD H. ELLIOTT
President
The George Washington University

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THE CALENDAR 1976-77*

1976 1977

AUGUST

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JULY

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1976 FALL SEMESTER

August 30 Orientation for students from foreign countries *Monday*

August 30 School of Government and Business Administration Faculty Meeting *Monday*

August 31 Placement tests, orientation, and advising for entering freshmen who did not attend Summer Advance Registration Sessions *Tuesday*

September 1 Orientation, placement tests, and advising for transfer students *Wednesday*

†*September 2–4* Registration *Thursday-Saturday*
Application for February graduation due as part of registration

September 6 Labor Day (holiday) *Monday*

September 7 Classes begin *Tuesday*

September 8 University Faculty Assembly Meeting *Wednesday*

September 10 Faculty Senate Meeting *Friday*

September 20 Application for October Ed.D. Comprehensive Examination due *Monday*

* This calendar is subject to change.
† The registration procedure and the hours of registration will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

October 1	School of Public and International Affairs and Sch of Government and Business Administration Facu Meetings *Friday*
October 6	Columbian College of Arts and Sciences Faculty Me ing *Wednesday*
October 8	Faculty Senate Meeting *Friday*
October 13	Application for School of Public and International Affa and School of Government and Business Administrati November Master's Comprehensive Examinations d *Wednesday*
October 16	Ed.D. Comprehensive Examinations *Saturday*
October 21	Board of Trustees Meeting *Thursday*
November 1	Application for spring-semester financial aid due *Mond*
November 5	School of Government and Business Administration Fa ulty Meeting *Friday*
November 12	Faculty Senate Meeting *Friday*
November 12	Application for December Ed.D., Ed.S., and M.A. Ed. Comprehensive Examinations due *Friday*
November 12–13	School of Public and International Affairs and School Government and Business Administration Master's Com prehensive Examinations *Friday-Saturday*
November 22	D.B.A., D.P.A., and Ph.D. Dissertations of February can didates due *Monday*
November 24	Thanksgiving recess begins after last class *Wednesday*
November 29	Classes resume *Monday*
December 3	School of Public and International Affairs and Schoo of Government and Business Administration Faculty Meetings *Friday*
December 7	Last day of fall-semester classes *Tuesday*
December 11	Ed.D., Ed.S. and M.A. in Ed. Comprehensive Examina tions *Saturday*
December 13–22	Examination period *Monday-Wednesday*
December 10	Faculty Senate Meeting *Friday*
January 3	Master's Theses of February candidates due *Monday*
January 3	Ed.D. Dissertations of February candidates due *Monday*

1977 SPRING SEMESTER

January 10	Orientation for students from foreign countries *Monday*
January 10	Columbian College and School of Government and Busi ness Administration Faculty Meetings *Monday*
January 11–12	Orientation for new students; advising for all students *Tuesday-Wednesday*
**January 13–15*	Registration *Thursday-Saturday* Application for May graduation due as part of registra tion
January 17	Spring-semester classes begin *Monday*
January 19	Board of Trustees Meeting *Wednesday*
January 20	Inauguration Day (holiday) *Thursday*
January 21	Faculty Senate Meeting *Friday*

* The registration procedure and the hours of registration will be stated in the *Schedule of Classes* which is available well in advance of each semester.

January 25	University Faculty Assembly Meeting *Tuesday*
February 1	Deadline for submission of 1977-78 freshmen student financial aid applications *Tuesday*
February 4	School of Public and International Affairs and School of Government and Business Administration Faculty Meetings *Friday*
February 11	Faculty Senate Meeting *Friday*
February 21	Winter Convocation (holiday) *Monday*
February 25	Columbian College of Arts and Sciences Faculty Meeting *Friday*
February 26	Ed. D. Comprehensive Examinations *Saturday*
March 1	Deadline for submission of 1977-78 continuing and transfer undergraduate student financial aid application *Tuesday*
March 4	School of Government and Business Administration Faculty Meeting *Friday*
March 9	Application for School of Public and International Affairs and School of Government and Business Administration April Master's Comprehensive Examinations due *Wednesday*
March 11	Faculty Senate Meeting *Friday*
March 12	Spring recess begins after last class *Saturday*
March 17	Board of Trustees Meeting *Thursday*
March 21	Classes resume *Monday*
March 21	Application for April Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations due *Monday*
March 28	D.B.A., D.P.A., Ph.D., and Ed.D. Dissertations of May candidates due *Monday*
April 1	School of Public and International Affairs and School of Government and Business Administration Faculty Meetings *Friday*
April 1	Deadline for submission of Summer Sessions and 1977-78 graduate financial aid application *Friday*
April 8	Faculty Senate Meeting *Friday*
April 15–16	School of Government and Business Administration and School of Public and International Affairs Master's Comprehensive Examinations *Friday-Saturday*
April 18	Master's Theses (other than those in the School of Public and International Affairs) of May candidates due *Monday*
April 22	Last day of spring-semester classes *Friday*
April 22	Master's Theses of May candidates in the School of Public and International Affairs due *Friday*
April 23	Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations *Saturday*
April 27	Columbian College of Arts and Sciences Faculty Meeting *Wednesday*
April 28–May 7	Examination period *Thursday-Saturday*
May 6	Faculty Senate Meeting *Friday*
May 8	Commencement *Sunday*
May 19	Board of Trustees Annual Meeting *Thursday*

FACTS ABOUT GEORGE WASHINGTON UNIVERSIT

General Information	Private, nonsectarian, coeducational, founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of Students	22,120 (14,405 men, 7,715 women)
Number of Undergraduates	6,278 (3,777 men, 2,501 women)
Geographical Origin of Students	50 states, District of Columbia, 150 countries
1976-77 Tuition	Undergraduate: $2,600 for two semester graduate: $98 for each semester hour (se page 29)
Number of Full-time Faculty	961 (81% with doctoral degrees)
Number of Part-time Faculty	380 (includes some of the most distinguished men and women in Washington who serve as professorial lecturers)
Residence Hall Space	1,932
Room and Board	Cost varies from $1,750 to $1,950 for th academic year (see page 57)

Undergraduate majors: Accounting, American Civilization, American Literature Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology, Botany Business Administration, Cartography, Chemistry, Chinese Language and Literature Civil Engineering, Classical Archaeology and Anthropology, Classical Archaeology and Classics, Classical Humanities, Computer Science, Dramatic Art, East Asian Studies (China and Japan), Economics, Electrical Engineering, Elementary Education, English Literature, Environmental Studies, Fine Arts, French Language and Literature, Geodesy, Geography, Geology, Germanic Languages and Literatures History, Human Kinetics and Leisure Studies, International Affairs, Journalism Judaic Studies, Latin American Studies, Law Enforcement, Mathematical Statistics Mathematics, Mechanical Engineering, Medical Technology, Music (Applied, History and Literature, Theory), Nurse Anesthetist Program, Nurse Practitioner Program Oceanography, Philosophy, Physician's Assistant Program, Physics, Political Science Premedicine, Psychology, Public Affairs, Radiologic Sciences and Administration Religion, Russian Language and Literature, Russian Literature and Culture in Translation, Secondary Education, Sociology, Spanish American Literature, Spanish Language and Literature, Speech Communication and Broadcasting, Speech Pathology and Audiology, Urban Affairs, Zoology.

Study leading to graduate or professional degrees is offered in the Graduate School of Arts and Sciences, the National Law Center, the School of Medicine and Health Sciences, the School of Engineering and Applied Science, the School of Education, the School of Government and Business Administration and the School of Public and International Affairs.

THE UNIVERSITY

HISTORY

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the federal city. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company, "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended a "fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical

School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half-century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he hoped to see established.

PURPOSE AND OBJECTIVES

The purpose of The George Washington University was to realize "the aspirations of Washington, Jefferson and Madison, for the erection of a university at the seat of the Federal Government." Over the years it has been the aim to develop the University ideal in the nation's capital with a view toward meeting the changing needs of society while continuing to pursue the traditional principles of learning and research.

The George Washington University now rededicates itself and all the resources at its command to the pursuit of knowledge and its dissemination. To this end:

The University recognizes its special opportunities in and obligations to one of the principal capitals of the world. It is a primary objective of the University to utilize its historical, geographical, and functional relationship to the nation's capital and the Washington community in continuing the development of a great nationally and internationally oriented university.

The University recognizes the needs of our times and accepts the challenge to develop each student's potential abilities to the fullest extent.

The University is and should remain privately controlled, nonsectarian and co-educational.

Admission to the University is determined only in terms of the personal character and academic qualifications of the candidates.

A broadly based liberal education is fundamental to the total program of the University.

Expansion of graduate and professional studies and research and the utilization for this purpose of the excellent research facilities and materials available in the nation's capital are basic to the continuous development of the University's educational program.

The provision of superior instruction and facilities and the application of high standards of entrance qualifications and academic achievement to all students whether full-time or part-time, on-campus or off-campus, are major missions of the University.

A balanced program of student extracurricular activities is an integral part of the University program.

The University will continue to strive to meet the evident needs of an enlarged student body while governing the size of enrollment by its capacity to supply adequate staff and facilities for the excellent teaching and research which it espouses.

THE COLLEGES, SCHOOLS AND DIVISIONS

George Washington University includes 12 colleges, schools, and divisions, as follows:

*Columbian College of Arts and Sciences** offers four-year programs in the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. The College also provides prelegal and premedical programs, and the preprofessional work required for admission to the School of Education and to the School of Public and International Affairs. Columbian College has academic jurisdiction over the off-campus programs leading to the degrees of Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Geodetic and Cartographic Science, and Bachelor of Science in Oceanography. These off-campus programs are administered by the College of General Studies.

The Graduate School of Arts and Sciences†‡ offers advanced study and research leading to the degrees of Master of Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Forensic Sciences, Master of Music, Master of Science, Master of Science in Forensic Science, Master of Science in Special Studies, Master of Science for Teachers, and Doctor of Philosophy. The degrees of Master of Arts in Special Studies and Master of Science in Special Studies are also available through off-campus programs administered by the College of General Studies.

*The School of Medicine and Health Sciences**† offers work leading to the degrees of Associate in Science, Bachelor of Science, and Doctor of Medicine.

The National Law Center‡ offers courses leading to the degrees of Juris Doctor, Master of Laws, Master of Comparative Law, Master of Comparative Law (American Practice), and Doctor of Juridical Science; and special programs in Continuing Legal Education.

The School of Engineering and Applied Science offers courses leading to the degree of Bachelor of Science in the following areas: Civil Engineering, Electrical Engineering, and Mechanical Engineering. Graduate programs lead to the degrees of Master of Science, Master of Engineering Administration, Doctor of Science, Engineer, and Applied Scientist. The School has academic jurisdiction over the off-campus programs leading to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. These off-campus programs are administered by the College of General Studies.

The School of Education offers undergraduate programs leading to the degrees of Bachelor of Arts in Education and Bachelor of Science in Human Kinetics and Leisure Studies; graduate studies leading to the degrees of Master of Arts in Education, Master of Arts in Teaching, Education Specialist, and Doctor of Education. The degree of Master of Arts in Education is also available through off-campus programs administered by the College of General Studies.

The School of Government and Business Administration‡ offers undergraduate programs leading to the degrees of Bachelor of Business Administration and Bachelor of Science in Health Care Administration; graduate programs leading

* Columbian College of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Bachelor of Arts and Doctor of Medicine.
† The Graduate School of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Master of Science and Doctor of Medicine and a dual program leading to the degrees of Doctor of Medicine and Doctor of Philosophy.
‡ The National Law Center cooperates with the School of Public and International Affairs, the Graduate School of Arts and Sciences and the School of Government and Business Administration in offering a program leading to the combined degrees of Juris Doctor and Master of Arts.

to the degrees of Master of Arts in Government, Master of Arts in Health Car Administration, Master of Business Administration, Master of Public Ad ministration, Master of Urban and Regional Planning; the Post-Master's Gradu ate Certificate in Health Care Administration; the degrees of Doctor of Busines Administration and Doctor of Public Administration. The School also ha academic jurisdiction over off-campus programs leading to the degrees o Bachelor of Science in Administration and Master of Science in Administration These off-campus programs are administered by the College of General Studies

*The School of Public and International Affairs** offers undergraduate pro grams leading to the degree of Bachelor of Arts and graduate programs leading to the degree of Master of Arts. The School also offers an off-campus program leading to the degree of Master of Science in International Affairs.

The College of General Studies supplements the adult education program of the University through campus and off-campus study; conferences, seminars, and special projects; and continuing education and noncredit programs. This College also administers the off-campus programs over which Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Engineering and Applied Science, the School of Education, and the School of Government and Business Administration have academic jurisdiction.

The Division of University Students makes available courses for students not candidates for degrees in this University.

The Division of Experimental Programs.

The Summer Sessions.

ACADEMIC STATUS

George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

The National Law Center is a charter member of the Association of American Law Schools and is approved by the Section of Legal Education and Admissions to the Bar of the American Bar Association. The School of Medicine and Health Sciences is a member of the Association of American Medical Colleges and is one of the medical colleges which have been continuously approved by the American Medical Association. Curricula of the School of Engineering and Applied Science in civil, electrical and mechanical engineering are accredited by the Engineers' Council for Professional Development. The School of Education is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education for its bachelor's and master's degree programs. The School of Government and Business Administration has maintained full membership in the Middle Atlantic Association of Colleges of Business Administration since 1961. It joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of the American Assembly of Collegiate Schools of Business. The programs in accounting satisfy the educational requirements for the Certified Public Accountant and the Certified Management Accountant professional examinations. The program in hospital administration is accredited by the National Accrediting Commission

* The National Law Center cooperates with the School of Public and International Affairs, the Gradu ate School of Arts and Sciences and the School of Government and Business Administration in offer ing a program leading to the combined degrees of Juris Doctor and Master of Arts.

on Graduate Education for Hospital Administration. The Master of Urban and Regional Planning degree program is recognized by the American Institute of Planners. The Department of Chemistry is on the approved list of the American Chemical Society. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The program in speech pathology and audiology is accredited by the Education and Training Board of the American Boards of Examiners in Speech Pathology and Audiology.

UNIVERSITY POLICY ON EQUAL OPPORTUNITY

In accordance with the stated policy of its Board of Trustees and in conformity with federal laws and regulations, George Washington University does not discriminate against any person on the bases of sex, race, color, religion or national origin in any of its education or employment programs or activities. Federal regulations implementing Title IX of the Education Amendments of 1972 call for an explicit statement that the requirement not to discriminate on the basis of sex extends to employment in and admission to such programs and activities.

Inquiries concerning the application of this policy and federal laws and regulations concerning discrimination in education or employment programs and activities may be addressed to the Office of the University's Coordinator of Equal Opportunity Programs or to the Director of the Office of Civil Rights of the Department of Health, Education, and Welfare.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the United States Information Agency, the Corcoran Gallery of Art, the Department of State, the Department of the Interior, the General Services Administration, the National Academy of Sciences and the John F. Kennedy Center for the Performing Arts.

GOVERNMENT

The University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the President of the University is an ex officio member. The members of the Board are named for a period of three years and are divided into three classes. The members of one class are elected at each annual meeting to fill the places of the members whose terms of office expire. Two members of each class are nominated by the Alumni Association.

THE UNIVERSITY LIBRARIES

The Library collections of the University are housed in the University Library, the general library of the University, and in the libraries of the Institute for Sino-Soviet Studies, the National Law Center, and the School of Medicine and Health Sciences.

These collections contain approximately 675,000 volumes, to which are added some 35,000 volumes a year. Endowments supplementing the University ap-

propriation provide books in the fields of American civilization, American liter ture, foreign service, history, public finance and the social sciences; and gif from many sources have enriched the collections. The Libraries currently receiv about 7,500 periodicals.

Information concerning the use of the Libraries may be obtained at the L brary service desks.

The Library is administered for the curricular, reference, and recreationa needs and interests of the students. Instruction in the use of the library is give upon request by the reference librarians. The Library endeavors to assist stu dents and all members of the University to use the rich library resources o Washington and the unusual opportunities they offer for extensive research Interlibrary loan arrangements are maintained with other libraries in the city and throughout the United States.

The student has access to the Library of Congress, the Public Library of the District of Columbia and its branches, and many of the great special collec tions of the government departments. Graduate students at George Wash ington University may, upon application, be issued a Consortium library card which permits direct borrowing from the libraries of the other Consortium institutions.

THE BOARD OF TRUSTEES OF THE UNIVERSITY

The President of the University is an ex officio member of the Board of Trus tees.

E.K. Morris, LL.D., D.P.S., *Chairman Emeritus*

Charles E. Phillips, LL.B., LL.M., *Chairman*
*Everett H. Bellows, M.A., *Vice Chairman*
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Jacqueline Cochran, L.H.D., LL.D., Sc.D.
Donald C. Cook, B.A., M.B.A., J.D., LL.M., L.H.D., LL.D.
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Admission

THE UNIVERSITY ACCEPTS BOTH MEN AND WOMEN. Students are admitted at the beginning of each semester and summer session.

The right is reserved to refuse admission to any student with an academic record which creates doubt of ability to succeed in college or who, for any other reason, would not be an acceptable student. In the selection process, there is no discrimination because of sex, race, color, creed, or national origin.

An application for admission to degree candidacy should be accompanied by a $10 (for undergraduate study) or $25 (for graduate study) application fee.* The application fee is waived for graduates of this University applying to the Graduate School of Arts and Sciences, and for students applying for readmission who were registered as degree candidates at the time of their last registration at this University and who have not since registered at another institution.

Applicants are urged to submit the application form and complete credentials well in advance of the semester for which they seek admission. Specific dates are given in each section below.

UNDERGRADUATE ADMISSION†

Forms for application for admission or readmission are available at and should be returned to the Office of Admissions, George Washington University, Washington, D.C. 20052.

Secondary School Students

Applicants who wish to begin college in the fall semester or in a summer session should apply during the fall term of the senior year in high school. Preference will be given to students who submit applications and required credentials prior to March 1. Students graduating at mid-year who wish to begin college in the spring semester should apply no later than November 1.

*Application fee must be by check or postal money order, payable to George Washington University.
†For detailed admission requirements, see the appropriate college or school in this Catalogue. Tests required for admission and test application information are described on pages 72-73 and 142-44. See pages 26-28 for admission requirements for students from foreign institutions.

Although decisions on most applications for the fall semester will re
submission of seventh-term grades and senior-year test scores, an earlie
cision will be given after September 1 to a student whose application bec
complete with a secondary school record through the junior year and ju
year test scores, provided these records clearly establish admissibility.

Early Admission Plan.—Unusually well-prepared students who have
pleted the junior year in high school may be considered for admission.
plan is designed for those students who, in terms of academic preparation
emotional maturity, are ready to enter college. More often than not,
student interested in early admission has substantially exhausted the
school offerings in several academic areas. For such students, remainin
high school for a senior year would not be in his or her best interest, no
the interest of the school.

To be considered for early admission, the student must:

1. meet most of the secondary school requirements for graduation
complete the University's required entrance units (see pages 71–72 and 13

2. have the unqualified recommendation of the secondary school princi
or counselor.

3. submit two letters of recommendation (in addition to the counselor
from teachers who can testify to the student's maturity and general readin
to enter college.

4. submit SAT or ACT scores.

The student's chances for admission will be improved if CEEB achieveme
tests or advanced placement tests in subjects taken in the sophomore year a
submitted.

Applicants from a second school must arrange to have sent directly fro
their schools to the Office of Admissions a complete academic record togeth
with a personal evaluation and recommendation from the principal. Th
information should be supplied on a standard form used by the secondar
school.

Transfer Students

Undergraduate transfer students from other institutions should submit applic
tion and required credentials prior to June 1 for the fall semester, November
for the spring semester, April 1 for the summer sessions.

The transfer student must be in good standing as to scholarship and conduc
A student who has been academically dismissed or suspended more than on
time will not normally be considered for admission.

An applicant who has attended one or more institutions of higher learnin
must request *each* registrar to mail directly *to the Office of Admissions* a tra
script of his or her record, *even though credits were not earned.*

If an applicant has fewer than 30 semester hours of acceptable work (*C* o
better in academic courses from an accredited institution) at the time the ap
plication is submitted, the applicant must request that his or her high scho
record and College Entrance Examination Board or ACT test scores be sent t
the Office of Admissions.

If high school units are not shown on the college transcript, the applica
must request that the high school record be sent to the Office of Admission

dvanced Tuition Deposit

fter notification of acceptance, a $100 advanced tuition deposit will be re-ired of all full-time undergraduate students including those readmitted. This eposit is not due until May 1 for students entering in the fall semester or ntil December 15 for students entering in the spring semester. The deposit is edited toward tuition and is not refundable.

dvanced Standing and Advanced Placement

REDIT FROM HIGHER INSTITUTIONS

Where there is no duplication involved either through course work or exami-ation, advanced standing may be granted for work successfully completed at ccredited institutions of higher learning. It will be granted only when it meets he requirements for the degree sought at this University and may be accepted rovisionally. Work of low pass grade (*D* or the equivalent) will not be con-idered for transfer.

Except for students transferring to the School of Government and Business Administration from a two-year or junior college in which case no more than 30 semester hours credit may be assigned, there is no strict limit to the total amount of credit that may be assigned. However, a student must satisfy the residence and course requirements for the degree sought at George Wash-ington University.

CREDIT BY EXAMINATION

Assuming there is no duplication of course work earned, a maximum of 30 semester hours of credit may be assigned upon admission to the University for each or any combination of the following:

COLLEGE ENTRANCE EXAMINATION BOARD ADVANCED PLACEMENT TESTS (APT)

Credit is assigned for examinations passed with scores of 4 or 5 on the basis of a score report sent to the Office of Admissions from the Educational Testing Service at the student's request. Examinations passed with scores of 3 will be considered for credit or placement if the student arranges to have the examina-ion paper sent to the Office of Admissions. The Advanced Placement Tests re administered in the secondary school in May of each year. Normally only tudents who complete a course designated as Advanced Placement are pre-ared for the examination. Arrangements for the examination are the re-ponsibility of the applicant and should be made through the secondary school ttended or with the Program Director. College Entrance Examination Board dvanced Placement Examinations, Box 592, Princeton, N.J. 08540, or Box 025, Berkeley, Calif. 94701.

OLLEGE ENTRANCE EXAMINATION BOARD COLLEGE-LEVEL EXAMINATION PRO-RAM (CLEP)

LEP offers two types of examinations: General and Subject Examinations. LEP General Examinations are offered in five areas: mathematics, social ences, humanities, natural sciences, and English composition. CLEP Sub-

ject Examinations measure achievement of specific college-level courses are offered in more than 20 subjects.

Upon admission to degree candidacy, credit is assigned for the Ge Examinations, with the exception of the English composition examinat passed at the 50th percentile or above (college sophomore norms). Credi assigned for the Subject Examinations passed at the level recommended in College Board model policy. A candidate for a degree from any school at University must seek departmental approval *prior* to taking the examinatio receive credit for a CLEP Subject Examination. Credit may not be earned passing the examination after having taken the equivalent course. Arra ments for the examinations are the responsibility of the applicant and sho be made with the College Entrance Examination Board College-Level Exa nation Program, Box 592, Princeton, N.J. 08540.*

COLUMBIAN COLLEGE OF ARTS AND SCIENCES SPECIAL DEPARTMENTAL EXAMINATIONS

See page 80, *Earning Credit by Examination.*

CREDIT EARNED THROUGH UNITED STATES ARMED FORCES INSTITUTE (USAFI)

Except for those students enrolled as candidates for the Bachelor of Busin Administration degree, credit is assigned for approved United States Arm Forces Institute college-level examinations passed with satisfactory scores.

CREDIT FROM SERVICE SCHOOLS

A limited amount of credit may be assigned for selected service school i struction received since 1941. No more than 30 semester hours may be assigne for a combination of service schools and examinations referred to abov Veterans should submit to the Office of Admissions photostatic copies of the service school records, indicating courses successfully completed with sufficie identification of the course to locate it in the *Guide to Evaluation of Educ tional Experience in the Armed Forces.*

ADVANCED PLACEMENT

Advanced placement or waiver of a requirement will be granted on the basis o scores on Achievement Tests of the College Entrance Examination Board a follows:

Achievement Test	Minimum Score	Exemption
English Composition	650	Waives Engl 10
English Composition	680	Waives Engl 11 or 12
European and/or American History	600	Waives Hist 39-40 and/or 71-72

* See page 147 for additional qualifications for applicants to the School of Government and Busi Administration.

French	650	Waives a two-year language requirement
German	600	
Hebrew	600	
Latin	600	
Russian	700	
Spanish	650	

GRADUATE ADMISSION*

Graduate School of Arts and Sciences.—Forms for application for admission or readmission are available at the Office of the Dean of the Graduate School of Arts and Sciences, George Washington University, Washington, D.C. 20052. Completed applications and requests for fellowship support must be submitted by February 15 (February 1 for students in Clinical Psychology and Art Therapy) for admission in the fall semester and by November 1 for the spring semester. Applications for graduate study are acceptable after these dates for admission in the corresponding semester and will be reviewed if time permits and if space is available in the program desired.

School of Education.—Forms for application for admission or readmission are available at the Office of the Dean of the School of Education, George Washington University, Washington, D.C. 20052. When completed, these application forms should be submitted to this Office no later than June 1 for the fall semester, November 1 for the spring semester, April 1 for the summer sessions.

School of Government and Business Administration.—Forms for application for admission or readmission are available at the Office of the Admissions Officer, School of Government and Business Administration, George Washington University, Washington, D.C. 20052. When completed, application forms for Master's degree programs should be submitted to this Office no later than April 1 for the fall semester, November 1 for the spring semester, April 1 for both summer sessions; those for doctoral programs should be submitted by March 1 for the fall semester, October 1 for the spring semester, and March 1 for both summer sessions. Applicants who received their undergraduate degrees from foreign universities must submit applications one month earlier in each case.

School of Public and International Affairs.—Forms for application for admission or readmission are available at the Graduate Admissions Office, School of Public and International Affairs, George Washington University, Washington, D.C. 20052. When completed, these application forms should be submitted to this Office no later than March 1 (February 1 for applicants for graduate fellowships or assistantships and foreign applicants). Admission is for the fall semester only. All credentials, including transcripts from all institutions attended, Graduate Record Examination scores, and letters of reference, must be received before the deadline date.

DIVISION OF UNIVERSITY STUDENTS ADMISSION†

Forms for application for admission to *nondegree* status in the Division of

* For detailed admission requirements, see the appropriate college or school in this Catalogue. See pages 26-28 for admission requirements for students from foreign institutions.
† See pages 26-28 for admissions requirements for students from foreign institutions

University Students are available at and should be returned to the Office Admissions, George Washington University, Washington, D.C. 20052. Wh completed, these application forms, with credentials when required, should received by the Office of Admissions no later than the Friday before the fi day of registration (see Calendar, pages 5–7). To avoid paying a late regist tion fee, every effort should be made to insure that any required credential in the Office of Admissions prior to registration. No application fee is charg for application for admission to this Division. For detailed entrance requi ments, see pages 192–93.

Registration in a given course may be denied students in this Division wh space is needed for degree candidates.

READMISSION

A student previously registered in the University who was not registered campus during the immediately preceding semester (summer session excluded must apply for readmission. Final dates for applying are the same as those f "Undergraduate Admission" (see pages 21–22), or "Graduate Admission" (s page 25). If the student applies as a degree candidate and was previous registered as a nondegree student, or if a student has attended one or mo higher institutions while absent from the University, the student must have com plete official transcripts sent to the appropriate office at this University fro each institution attended. Applications for readmission are considered on th basis of regulations currently effective.

The application fee is waived for a student applying for readmission wh was registered as a degree candidate at the time last registered at this Universi and who has not since registered at another institution.

STUDENTS FROM FOREIGN INSTITUTIONS[1]

Application, required records, and scores on the *Test of English as a Foreig Language* (see page 27) should be received from *foreign applicants* no late than March 1 (February 1 for applicants for graduate study in the School Public and International Affairs) for the fall semester and October 1 for th spring semester.

George Washington University offers an English-language program f foreign students.

Required Records

At the time the application is sent, the applicant must request the educationa institution previously attended to send directly to the appropriate admissio office (see "Undergraduate Admission," pages 21–22, or "Graduate Admi sion," page 25), copies of official certificates and records listing subjects studie grades received, examinations taken and degrees received. Certified copies

[1] For detailed admission requirements, see the appropriate college or school in this Catalogue. Te required for admission and Educational Testing Service information are described on pages 142-44 and 192-93.

diplomas and certificates from all secondary schools, colleges and universities attended are required. Records of state examinations and certificates are also required. These records become the property of the University and cannot be returned.

These documents should be in the language in which the institution keeps its official records. If they are in a language other than English, the copies which are sent should be accompanied by an English translation.

Language Tests

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language* (TOEFL). Students are responsible for making arrangements for taking the test by addressing inquiries to the following agencies:

1. All European countries (including Cyprus, Great Britain, Iceland, and Ireland):

   CITO
   Postbus 1034
   Arnhem, Netherlands

2. All Middle Eastern and North African countries (except Israel):

   American Friends of the Middle East
   Abou Shakra Building
   Rue Bliss (Manara)
   Beirut, 2500 Lebanon

3. Hong Kong:

   Institute of International Education
   408 J. Hotung House, Fourth Floor
   5/15 Hankow Road, Kowloon, Hong Kong

4. India:

   Bureau of Educational Research
   Ewing Christian College
   Allahabad, U.P., 211003, India

5. Republic of China:

   Language Center, 2-1 Hsu-chow Road
   Taipei, Taiwan (100), Republic of China

All other applicants should address inquiries to TOEFL, Educational Testing Service, Princeton, N.J. 08540, U.S.A. The completed application form should be returned to the appropriate agency well in advance of the beginning of the semester for which the applicant seeks admission. The test fee remitted with the application entitles the student to have the test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does not constitute application for admission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and an application blank. On the application for the test, the student should specify that the scores be sent to the appropriate admissions office at this University

(see "Undergraduate Admission," pages 21–22, or "Graduate Admis
page 25).

In addition to the TOEFL, an admitted student is required to take an E
Proficiency Test prior to registration. Results of this test will determin
courses the student will be permitted to register for in the program of s
If the knowledge of English is inadequate to enable the student to unde
any academic work, the student will not be permitted to register for
courses other than English and will be required to study English on a full
basis either at this University or at a recognized language institution.

TRANSFER WITHIN THE UNIVERSITY

For information concerning transfer from one college, school, or divisio
another within the University, see page 48.

Registrati

THE DATES, HOURS, AND PLACE OF REGISTRATION will be stated in the *Sched
of Classes*, which is available well in advance of each semester.

A student cannot register for classes until the student has received a letter
admission to the University issued by the appropriate admitting office.

No registration is accepted for less than a semester or one summer session

A student may not register concurrently in this University and another in
tution without the prior permission of the dean of the college, school, or di
sion in which registered in this University. Registration in more than o
college, school, or division of the University requires the written permission
the deans concerned, *prior to registration*. Allowance of credit for work do
concurrently at another institution is at the discretion of the appropriate co
mittee.

Eligibility for Registration

Registration for the following categories of campus students is held on the da
of registration stated in the University Calendar. A student who is suspend
or whose record is not clear for any reason is not eligible to register. Registr
tion in a given course may be denied students in the Division of Universi
Students when space is needed for degree candidates.

New Student.—Upon receipt of a letter of admission, the new student
eligible for registration on the stated days of registration.

Readmitted Student.—A student previously registered in the University wh
was not registered for campus courses during the preceding semester or sum
mer session must apply for and receive a letter of readmission from the appr
priate admitting office before he or she is eligible for registration.

Continuing Student.—The student registered for campus courses in the im
mediately preceding semester or the summer session preceding the fall semest
is eligible to register assuming good standing and enrollment in a continui
program.

Registration Changes and Withdrawals (See pages 47, 48)

Registration for Consortium Courses

Full-campus degree students interested in taking courses at any of the other institutions in the Consortium of Universities of the Washington Metropolitan Area, Inc. (see pages 52–53), should consult the program announcements of the other institutions. Consortium application forms and instructions are available in the Office of the Registrar after the student has obtained registration materials. In order to participate in the Consortium program the student must obtain the approval of an adviser and should ascertain from the department of the institution where the course is taught whether or not he or she is eligible for the course and whether there is a space in the class. Specific inquiries should be addressed to the Registrar.

Fees and Financial Regulations

FEES PAID BY STUDENTS cover only a portion of the cost of the operation of the University. Income from endowment funds, grants, and gifts from alumni and friends of the institution make up the difference.

The following fees and financial regulations were adopted for the 1976 summer sessions and the academic year 1976-77. (See pages 31–32 for projected tuition increases for 1977-80.)

Tuition Fees

For undergraduate study in Columbian College of Arts and Sciences, the School of Education, the School of Government and Business Administration, the School of Public and International Affairs; and for courses taken on campus by undergraduate students in the College of General Studies:

Full-time program (12 or more), each semester	$1,300.00
Part-time program, for each semester hour	98.00
Summer Sessions, for each semester hour	98.00

For graduate study* in the Graduate School of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs; and for courses taken on campus by graduate students in the College of General Studies (Exception: doctoral students registered prior to July 1, 1967, who wish to continue payments according to the plan (see below) in effect prior to that date):

For each semester hour for which a student registers	$ 98.00

For students registered in the Division of University Students:

For each semester hour for which the student registers	98.00

* Payment of tuition for a Master's thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted in accordance with the regulations of the school in which the student is registered.

For students registered for doctoral degrees* in the Graduate Council (now the Graduate School of Arts and Sciences) and the School of Government and Business Administration prior to July 1, 1967, who wish to continue payments according to the plan in effect prior to that date:

For work leading to and including the general examination
For work leading to and including the final examination 2,

For students registered for the Doctor of Education degree† prior to July 1, 1967, who wish to continue payments according to the plan in effect prior to that date:

For work leading to and including the major field examination 3,2
For work leading to and including the final examination 1,9

University Center Fee (charged all students registered on campus,‡ nonrefund

For students registered for 11 or more semester hours on campus:
Each semester

For students registered for less than 11 semester hours in a semester on campus:
For each semester hour for which the student registers

For students maintaining "continuous registration" status:
Each semester

Additional Course Fees

In certain courses additional fees, such as laboratory and material fees, are char as indicated in the course descriptions. These fees are charged by the semester a unless otherwise indicated, may be defrayed in two payments when the tuition is p in this manner. Breakage of apparatus is charged against the individual stude When breakage is in excess of the normal amount provided for in the laboratory f the individual student will be required to pay such additional charges as are det mined by the department concerned.

Graduation Fees

Associate in Arts
Bachelor's, Master's, Education Specialist, Doctor's degrees $10.
Post-Master's Graduate Certificate in Health Care Administration 25.
Fee for Binding Master's Thesis 25.
Fee for Microfilm Service and Printing Announcement of Final Examination (Doctoral candidates) $10.
Residence Hall Fees (see page 58) 60.

Special Fees and Deposits

Application fee (undergraduate degree candidate), nonrefundable 10.

* The tuition fee is to be paid at the rate of $650.00 a semester or in full at the beginning of ea stage of the doctoral discipline. No "continuous registration" fee will be charged if a third ye is needed for completion of either part of the degree requirements. If still more time is needed the student must maintain continuous registration and pay the continuous registration fee.

† As long as there is an unpaid balance for the part of the program on which the student working, he must make at least the minimum tuition payment of $325.00 at each fall and spri registration and for any summer session in which he registers for academic work.

If the total fee is paid for the part of the program on which the student is working, he m continue to register, without additional fee, for courses approved by his Master in Research, until the expiration of the time allowed for that part of his program.

‡ Students in the College of General Studies are charged the University Center Fee only wh registered for courses on campus.

Application fee (graduate degree candidate), nonrefundable	25.00
Advanced tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student	100.00
Housing deposit, nonrefundable, charged each applicant for residence hall space	100.00
Admission tests (when required)	6.00–12.00
National Teacher Examinations fee, for Bachelor of Arts in Education degree candidates	9.00–13.00
Late-registration fee, for failure to register within the designated period	15.00
Late-payment fee, for failure to make payments when due (see "Payment of Fees," pages 32–33)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 32–33)	35.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, returned by the bank for insufficient funds, or for any other reason	15.00
Continuous Registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements*—due and payable on the official days of registration	98.00
For special physical examination	2.00
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25.00
For each examination to qualify for advanced standing and for each special examination	5.00
English test for foreign students (when required)	5.00
Laboratory checkout fee, for failure to check out of Chemistry laboratory by the date deadline set by the instructor†	10.00
Transcript fee, for each transcript of record	2.00
If two or more transcripts are requested at the same time, fee for each of the first two copies is $2 each, fee for each additional copy	.50
Replacement of lost or stolen picture identification card	2.00

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES 1977-80

In order that students and their parents may plan more realistically for a total four-year period, tuition increases for the academic years 1977-78, 1978-79 and 1979-80 have been estimated as follows:

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* Payment of the continuous registration fee entitles the student who is granted leave of absence to return and continue work toward a degree under the academic requirements which were in force at the time of the student's first registration. The continuous registraion fee applies toward neither tuition fee nor residence requirements for the degree.
This fee does not apply to students granted military leave, see page 49.

† A student who drops a Chemistry course before the end of the semester must check out of the laboratory at the next laboratory period.

Increase by year (full-time undergraduate students):

1977–78
1978–79
1979–80

***Increase by semester hour (graduate and part-time undergraduate students):**

1977–78
1978–79
1979–80

It is not possible to project future economic data with certainty. The in
outlined above are merely estimates based on present circumstances and
in no way be interpreted as fixed limits on tuition increases. The Uni
hopes to keep tuition increases as low as possible, but it is obligated to
tain a sound financial basis. Economic conditions in the recent past
ticularly as they affect private educational institutions, have been extr
variable, and significant increases in tuition in excess of the above limit
be required.

PAYMENT OF F

No student is permitted to complete registration or attend classes unti
charges are paid. Tuition and fees for each semester are due and payab
full at the Office of the Cashier at the time of each registration. Checks
postal money orders should be made payable to George Washington Univer
with the student identification number in the upper left-hand corner.

The Student Accounts Office has responsibility for billing and maintai
student accounts for tuition, various fees, and room and board charges. A
dent registered for six semester hours or more may sign a deferred paym
contract with the Student Accounts Office at the time of each registration
mitting him to pay one-half of the total tuition and fees (except for fees p
able in advance) at the time of registration and the remaining half on or
fore October 27, 1976 (for the fall semester), and March 9, 1977 (for
spring semester). Interest at the rate of 8 per cent per annum on the unp
balance will be charged from the date of registration to the date payment
made.

Students receiving tuition assistance in the form of scholarships, gover
ment tuition contracts, or other forms of tuition awards are not permitted
sign deferred payment contracts unless the total tuition and fee charges exce
the value of the tuition awards by $618.00 or more. Under such circumstanc
the student may be permitted to pay one-half of the amount due from t
student at the time of registration and to defer the balance by signing a d
ferred payment contract.

Students who fail to make any payment when due will be automatica
charged a $15 late-payment fee and will be subject to the interest charge of
per cent per annum. Accounts which become 30 days past due will be fina

* Semester-hour increases become effective at the beginning of the summer sessions preceding
academic year.

ly encumbered. In the event a student's account is financially encumbered, student forfeits his rights to the use of deferred payment contracts in future esters, and the Student Accounts Office will notify the Registrar to with- grades, future registration privileges, transcripts, diplomas, and other aca- ic information until the account is settled financially. Financial settlement require payment in full of all amounts due the University in addition to a ncial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered credit.

PREPAID AND DEFERRED PAYMENT PLANS

eral commercial programs for parents who wish to pay for college on a nthly basis are available. Terms and conditions vary, but most provide a life urance policy in the contract. For specific details and applications, address uiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply applications for these various programs, but will be happy to provide guid- ce to students and parents.

ITHDRAWALS AND REFUNDS*

pplications for withdrawal from the University or for change in class sched- e must be made in person or in writing to the dean of the college, school, division in which the student is registered. Notification to an instructor is ot an acceptable notice (see "Withdrawal," page 47).

In authorized withdrawals and changes in schedule, cancellations of semester uition charges and fees will be made in accordance with the following schedule or the fall and spring semesters:

. *Complete withdrawal from the University:*

ALL SEMESTER

Withdrawal dated on or before September 10, 1976	90 per cent
Withdrawal dated September 13 to September 24, 1976	75 per cent
Withdrawal dated September 27 to October 8, 1976	50 per cent
Withdrawal dated after October 8, 1976	none

PRING SEMESTER

Withdrawal dated on or before January 21, 1977	90 per cent
Withdrawal dated January 24 to February 4, 1977	75 per cent
Withdrawal dated February 7 to February 18, 1977	50 per cent
Withdrawal dated after February 18, 1977	none

. For a *change in status from full-time to part-time student* or for *partial*

* Regulations concerning withdrawal and refunds for the summer sessions are stated in the *Summer ssions Schedules.*

withdrawal by a part-time student, the above schedule applies to the di
ence in charges between the original program and the adjusted prog
continuing in effect.

3. A student enrolled in an undergraduate full-time program who d
or adds a course and continues to be in a full-time program will have
financial adjustments of tuition made other than those involving course
4. A student who is granted military leave before completing the semester
receive credits for current charges in accordance with the schedule for c
plete withdrawal from the University (see No. 1 above). Payments m
in excess of the nonrefundable balance will be refunded to the stud
The nonrefundable balance will be maintained as a deferred credit for
by the student when he returns to the University (see "Military Lea
page 49).
5. Regulations governing student withdrawals as they relate to resident
and food service charges are contained in the specific lease arrangements

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In no case will tuition be reduced or refunded because of absence from clas

Payment applies only to the semester for which a registration charge is
curred and will not be credited to another semester (exception: students gran
military leave, see page 49).

Authorization to withdraw and certification for work done will not be gi
a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can m
banking arrangements in the community.

Financial A

FOR UNDERGRADUATE STUDENT

GEORGE WASHINGTON UNIVERSITY offers a program of financial assistance
two basic types: awards for academic achievement without reference to fin
cial circumstances—honor scholarships; and scholarships, grants, loans,
employment based upon demonstrated financial need.

Honor Scholarships.—George Washington University honor scholarships
up to $1,000 for the academic year based entirely upon academic achievem
and potential without regard to financial need, are restricted to incoming fre
men and are extremely limited in number.

Need-based Aid.—The University offers extensive programs of scholarsh
grants, loans, and employment based upon demonstrated need. The Univers
participates in the National Direct Student Loan, Basic Educational Opp
tunity Grant, Supplemental Educational Opportunity Grant, and the Colle
Work-Study programs.

Applications and supporting credentials for financial aid must be filed
February 1 (entering freshmen), March 1 (enrolled undergraduate or enter
transfer students) preceding the academic year of the award for the fall
mester; by November 1, for the spring semester; and April 1, for the sum

* For information concerning financial aid for students from foreign countries, see page 40.

ssions.* A student must reapply for financial aid each year.
Complete information concerning financial assistance is contained in the mphlet "Student Financial Aid," which is available at the Office of Student nancial Aid, George Washington University, Washington, D.C. 20052.

The following scholarships are available to students in Columbian College of rts and Sciences, the School of Education, the School of Government and siness Administration, and the School of Public and International Affairs. he University also offers other scholarships which are available to students in ese colleges and schools as well as other schools.

The George Washington University Board of Trustees Scholarships.—Full- nd partial-tuition scholarships, which begin in the fall semester and extend r four successive academic years, provided the holder maintains a *B* average, well as a high standard of deportment, and continues to be in financial need. andidates must plan to select a curriculum leading to a bachelor's degree any school of the University, except the College of General Studies. Stu- ents who have demonstrated outstanding ability in interscholastic speech and ebate activities are eligible for the George F. Henigan Scholarships in Debate hich are included among these scholarships.

ther Scholarships

chievement Rewards for College Scientists (ARCS) Foundation, Inc.. Scholarship
herman Page Allen Memorial Scholarship Fund (1966)
lumni Scholarships
Mary J. Anderson Scholarship (1969)
Bache and Company Scholarships
Byron Andrews Scholarship (1920)
Henry N. Brawner, Jr., Foundation Scholarship Fund (1963)
Emma K. Carr Scholarships (1932)
Maria M. Carter Scholarship (1871)
Paul E. Casassa Memorial Foundation Scholarship (1968)
Chi Omega Alumnae Scholarship (1966)
Columbian Women Scholarship Funds
Victoria Briggs Scholarship Fund (1959)
Elizabeth V. Brown Scholarship Fund (1925)
Grace Ross Chamberlin Scholarship Fund (1932)
College Women's Scholarship Fund (1926)
Columbian Women Members' Scholarship Fund (1961)
Arline Hughes Dufour Scholarship Fund (1961)
Dr. Watson W. Eldridge, Jr., and John F. Eldridge Scholarship Fund (1964)
Founders of Columbian Women Scholarship Fund (1920)
Rose Lees Hardy Foundation Scholarship Fund (1957)
Lillian Young Herron Scholarship Fund (1925)
Nellie Maynard Knapp Scholarship Fund (1915)
Marcia B. Kraft Scholarship Fund (1966)
Janet McWilliams Scholarship Fund (1954)
Marie-Louise Ralph Turner Scholarship Fund (1963)

* Only students who are enrolled in this University for at least 8 semester hours in the immediately preceding spring semester or who have applied for financial aid for the following fall semester are eligible for consideration for Summer Sessions financial aid.

D.C. Daughters of the American Revolution Scholarship (1952)
Isaac Davis Scholarship (1869)
District of Columbia Institute of Certified Public Accountants Scholar
Accounting (1964)
Estella Constance Drane Scholarship (1957)
Louise Smith Engel Scholarship (1972)
Robert Farnham Scholarship (1871)
Federal Government Accountants Association—Washington, D.C., Cha
Scholarship in Accounting
Esther Brigham Fisher Scholarship (1951)
Foreign Student Scholarships (see page 40)
Mildred Green Memorial Scholarship Fund (1959)
Anna Spicker Hampel Scholarship (1949)
Julian O. Hargrove Scholarship (1968)
Elma Lewis Harvey Scholarship (1921)
Hazleton Scholarship (1950)
George F. Henigan Scholarships in Debate (1967)
David B. and James L. Karrick, Jr., Scholarship Fund (1968)
Samuel and Elizabeth Kay Scholarships 1969)
Amos Kendall Scholarship (1869)
L. Poe Leggette Memorial Scholarship Established by WRGW (1968)
Martha's Marathon Residence Hall Scholarship
Mitchell-Stancioff Scholarship (1967)
A. Morehouse Scholarship (1861)
E. K. Morris Education Fund Scholarships (1972)
Helen Marie and Thomas E. Orr Scholarships (1965)
Phi Delta Gamma Scholarships (1956)
Fred B. and Alma D. Pletcher Scholarship Fund (1968)
Levin M. Powell Scholarships (1886)
Research Assistantships in Operations Research and Related Fields (see
37)
Resident Assistantships (see page 37)
Henry Whitefield Samson Scholarship Fund (1966)
Lula M. Shepard Scholarships (1946)
Sigma Delta Chi Foundation of Washington, D.C., Scholarships
Margaret Lucille Snoddy Scholarship (1970)
David Spencer Scholarship (1918)
Mary Lowell Stone Scholarship (1893)
Charles Clinton Swisher Scholarships (1941)
Tau Kappa Epsilon Scholarship (1959)
U.S. Office of Education Traineeships (1964)
University Players Scholarship in Memory of L. Poe Leggette (1968)
William Walker Scholarship (1824)
Abigail Ann Brown and Henry Kirk White Scholarship Fund (1963)
John Withington Scholarship (1830)
Women's Physical Education Alumnae Association Scholarship (1964)
William G. Woodford Scholarship (1969)
Ellen Woodhull Scholarship (1919)
Zonta Club Scholarship (1950)

rants

he following funds have been established to meet the special needs of disadntaged students from the District of Columbia Inner-City and the Washington etropolitan area.

eorge Washington University's Educational Opportunity Program Tuition Grants (1968)

y Club of Walt Whitman High School, Bethesda, Md., Grant (1968)

arriott Foundation Grant (1968)

FOR GRADUATE STUDENTS*

he George Washington University program of financial assistance for graduate udents includes assistantships, fellowships, traineeships, graduate scholarships, esearch appointments, part-time employment, and loans. Application for admission to graduate study is a prerequisite for consideration.

Application and correspondence concerning assistantships, fellowships, traineeships, or graduate scholarships should be sent directly to the dean of the chool concerned, and addressed to George Washington University, Washingon, D.C. 20052. Unless otherwise specified, application and supporting credenials should be submitted no later than February 1 preceding the academic year or which the award is made.

Assistantships

Research Assistantships in Operations Research and Related Fields.—Available o graduates, and to undergraduates on the junior and senior levels, in any chool of the University. Research Assistants are expected to work 20 hours a week conducting research in support of an established research program, n programming or in conducting individual research on an approved research project. Stipends range up to $8,000, depending on the status of the student and the tenure of the appointment (9–12 months). Further information and applications are available from Director, Institute for Management Science and Engineering, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20052.

Resident Assistantships (men and women).—Available to graduate students and seniors in any field of study who are interested in working with the student personnel program in University residence halls. Specific duties vary with the position, but basically consist of counseling, advising student groups, and administration. Remuneration includes full tuition and a furnished room for the academic year. All positions are part-time, and staff members are required to enroll as full-time students in degree granting programs. Application should be completed before March 1. Further information may be obtained from the Office of the Director of Housing.

Arlington County—George Washington University Cooperative Assistantship Program

Health Care Administration Research Assistantships

* For information concerning financial aid for students from foreign countries, see page 40.

National League of Cities/George Washington University Assistantship
Urban Affairs Assistantship

Fellowships, Internships, Traineeships, Special Programs

The following fellowships, internships, and traineeships are available to
in the Graduate School of Arts and Sciences, the School of Educat
School of Government and Business Administration, and the School o
and International Affairs. The University also offers many other fell
which are available to students in these colleges and schools.

Graduate Fellowships.—Available to graduate students in master's a
toral programs in most departments of the University. Fellowships ar
on scholarship and each fellow may receive a stipend, tuition allowan
course fees.

Graduate Teaching Assistantships.—Available to graduate students i
ter's and doctoral programs in most departments of the University. A Gr
Teaching Assistantship receives financial compensation for a designated
service to the assistant's major department of instruction.

Research Traineeships.—Available under numerous sponsored progran
number of departments. Currently, the basic medical science departmen
the departments of Psychology and Speech and Drama offer such prog
Stipends vary; information is available from the departments and the Of
the Dean of the Graduate School of Arts and Sciences.

Achievement Rewards for College Scientists (ARCS) Foundation, Inc., Fe
ship
Robert A. Aleshire Fellowship Fund (1971)
American Association of Collegiate Schools of Business Fellowship
American Civilization Fellowships
American Civilization Internships (Smithsonian Institution-George Washin
University Cooperative Program)
American Iron and Steel Institute Fellowship
Arthur Anderson & Co. Doctoral Fellowship
Aryamehr Research Fellowships
Winfield Scott Blaney Fellowship in International Affairs (1961)
Oliver T. Carr, Sr., Memorial Fellowship in Urban and Regional Planning (19
Thomas Alva Edison Fellowship
Elementary Teacher Education Internships
Ernst & Ernst Grant to Doctoral Candidates in Business or Economics
Foreign Student Fellowships (see page 40)
Health Care Administration Fellowships
Richard D. Irwin Doctoral Fellowships
Isabella Osborn King Research Fellowships (1927)
Loula D. Lasker Fellowships in Housing, City Planning, or Urban Renewal
Mellon Foundation Fellowships
Minorities in Planning and Related Professions Program
National Association of Purchasing Management Fellowship
National Historical Publications Commission-George Washington University
Cooperative Research Fellowships
National Science Foundation Graduate Fellowships
Resources for the Future, Inc., Fellowship Prize

ge Bibliography Internships
omas Bradford Sanders Fellowships (1928)
ottish Rite Foundation Fellowships
S. Office of Education Fellowships (1964)
S. Public Health Service Traineeships
S. Public Health Service Traineeships in Comprehensive Health Planning
ban Studies Fellowships of the Department of Housing and Urban Development
ban Transportation Center Fellowship

aduate Scholarships

med Forces Health Professions Scholarship Program (The Uniformed Services Health Professions Revitalization Act of 1972 (Public Law 92-426)
mma K. Carr Scholarships (1932)
ul H. and Margaret M. DeMaine Scholarships (1967)
strict of Columbia Institute of Certified Public Accountants Scholarship in Accounting (1964)
oster G. McGaw Scholarship in Health Care Administration (1971)
itchell-Stancioff Scholarship (1967)
aul Pearson Scholarship Fund (1940)
hi Delta Gamma Scholarship Fund (1968)
oorhees Scholarships
olcott Foundation Scholarships

ponsored Awards for Graduate Study

nformation regarding awards sponsored by foundations, professional and earned societies, industries, and others which may be used in support of raduate study is available at the Graduate Fellowship Information Center, 2025 H Street N.W., for students enrolled at George Washington University. Information is also available on distinguished programs such as the Rhodes, Marshall, National Science Foundation, Fulbright, Rotary International, and Danforth, as well as many others.

As deadlines for application vary, qualified students should make inquiries well in advance of the year of planned graduate study.

LOAN FUNDS

The following loan funds are available to undergraduate and/or graduate students in Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs. A separate application must be submitted for all loan programs. Applications for the National Direct Student Loan should be filed no later than April 1 for the following academic year. Complete information is contained in the pamphlet "Student Financial Aid," which is available in the Office of Student Financial Aid, George Washington University, Washington, D.C. 20052.

American Medical Association Nursing Home Administration Loan Fund
Foreign Student Loan Fund (1967)

W. K. Kellogg Foundation Hospital Administration Loan Fund
Jessie B. Martin Loan Fund (1967)
National Direct Student Loan Program
Ellis H. Stearman Emergency Loan Fund
Hiram Miller Stout Memorial Loan Fund (1973)
U. S. Loan Program for Cuban Students
University Student Emergency Loan Fund

STUDENT EMPLOYMENT

The University participates in the College Work-Study Program. Inqu should be addressed to the Office of Student Financial Aid. In addition, Student and Alumni Career Services Office maintains a registry of both full- and part-time positions available in the Washington area for undergrad and graduate students.

After registration, students may apply at the Student and Alumni Ca Services Office, Woodhull House, 2033 G Street, N.W., for interviews and ferrals to positions for which they are qualified.

FOREIGN STUDENTS

Undergraduate foreign students with proven financial need who have comple one semester of full-time work (15 hours) at this University with a *B* aver are eligible to apply for the Board of Trustees Scholarships. Scholarships awarded in the spring for the following academic year. See instructions applying for undergraduate financial aid, pages 34–35.

Limited awards for graduate teaching fellowships are the responsibility of chairman of the department or dean of the school in which the degree is to earned. Work as a teaching fellow requires excellent knowledge of Englis both spoken and written.

Long-term loan funds for undergraduate and graduate foreign students limited in amount and are available only to those foreign-born persons who h established resident status in the United States through the Immigration a Naturalization Service.

We suggest that students who wish to study in the United States have ava able sufficient funds to cover expenses for one full year before attempting enter a college or university. The cost at this University for one academic ye (September-May) is approximately $5,500. This estimate includes room a board, tuition, books, clothes, and incidental expenses; no travel, holiday, medical expenses are included.

LAW ENFORCEMENT EDUCATION PROGRAM

This program of grants and loans, authorized under the provisions of the Omn bus Crime Control and Safe Streets Act of 1968, is intended to help pay t cost of educational expenses of officers who are employed by publicly funde law enforcement or correctional agencies. Studies may be full- or part-time a wide range of subject areas and degree goals. Priority will be given to office on the state and local levels, and to veterans of the Armed Forces of the Unit States. Applications and further information are available from the LEEP C ordinator, Graduate School of Arts and Sciences.

Accounting Prizes.—Three prizes awarded annually by the Department of Accounting—one each to the undergraduate Accounting major with the highest scholastic standing, to the candidate for the degree of Master of Business Administration with the highest scholastic standing in the Accounting concentration, and to the Doctoral candidate with a field in Accounting who has the highest scholastic standing at the completion of the General Examination.

Alpha Chi Sigma Prize.—Awarded annually by the Alpha Pi Chapter to the student who has attained the highest academic record in courses in chemistry. The name and year of graduation of the student is inscribed on a bronze plaque. The winner must have had at least 16 hours in chemistry, including the final semester at this University.

Alpha Kappa Psi Prize.—A key, awarded annually by Beta Mu Chapter to the School of Government and Business Administration undergraduate student who has completed 90 semester hours at this University and attained the highest grade average. The name of the winner and the year of the award are engraved on a plaque in the Office of the Dean of the School of Government and Business Administration.

American Institute of Chemists Prize.—A medal awarded annually to the graduating student majoring in chemistry who excels in scholarship, integrity, and leadership.

Department of Art Prizes.—Two prizes—one for an undergraduate majoring in Art History and one for an undergraduate majoring in Fine Arts—awarded annually to the most promising students, as determined by the departmental faculty.

The Walter G. Bryte, Jr., Achievement Award.—Provided by Walter G. Bryte, Jr., Colonel, U.S. Air Force (retired), first Professor of Air Science at George Washington University. The award is presented annually primarily to that undergraduate residence hall, secondarily to any other activity at the University, which has shown under the leadership of its elected or designated head, the most improvement or excellence in its support of the principles and aims of the United States of America and George Washington University. The hall or other activity will be awarded a cash prize, and the name of its leader and the hall or activity will be engraved on a silver trophy.

Byrne Thurtell Burns Memorial Prize.—Awarded to the senior majoring in chemistry who shows the greatest proficiency in organic chemistry, as evidenced by a comprehensive examination, and who possesses such qualifications of mind, character, and personality as to give promise of future achievement.

Business Administration Prize.—Awarded annually by the Department of Business Administration to the outstanding graduating senior in business administration on the basis of scholarship, leadership and service to the University.

Wilbur J. Carr Prize.—Established in 1962 by Edith K. Carr, former Trustee of the University, in memory of her distinguished husband, who was graduated from the School of Comparative Jurisprudence and Diplomacy in 1899. It is awarded annually to that man in the graduating class of the University who has demonstrated outstanding ability in his study of international affairs and who has given evidence of possessing in marked degree the qualities which produce the good citizen and the dedicated public servant.

The Chemical Rubber Co. Freshman Chemistry Achievement Prize. *Handbook of Chemistry and Physics* awarded annually to the freshman stu who has demonstrated the greatest achievement in Chemistry 15-16.

The Columbian Women Prize.—Awarded to the senior woman who in undergraduate life has most nearly fulfilled the objectives of Columbian Wor

John Henry Cowles Prizes.—Two prizes, established by John H. Cov Grand Commander of the Supreme Council of Thirty-third Degree (Mo Council of the World) of the Ancient and Accepted Scottish Rite of F masonry, Southern Jurisdiction of the United States of America. Awar annually to the senior in the School of Government and Business Adminis tion and to the senior in the School of Public and International Affairs with highest academic averages.

DeWitt Clinton Croissant Prize.—Awarded annually to the undergrad student enrolled in a course in drama or active in University dramatics submits to the English Department the best essay on drama or the theatre.

E.K. Cutter Prize.—Established by Marion Kendall Cutter "for excelle in the study of English." Awarded to the member of the graduating class wh record in English, combined with general excellence, shows most marked a tude for and attainment in English studies.

Isaac Davis Prizes.—Established in 1847 and awarded annually to the th seniors who have made the greatest progress in public speaking while enro in the University. Awards are to be determined by a public-speaking con in which the participants deliver original orations. Only members of the se class of Columbian College of Arts and Sciences who are candidates for degree of Bachelor of Arts or Bachelor of Science are eligible to compete

Henry Grattan Doyle Memorial Prize.—Established in memory of He Grattan Doyle, a former Dean of Columbian College. Awarded annually an outstanding senior for excellence in Spanish.

Elton Prize.—Established by the Reverend Romeo Elton, of Exeter, E land, and awarded annually to the student with the highest average in the n advanced course in the Greek language and literature.

Jesse Frederick Essary Prize in Journalism.—Established by Helen Ess Murphy and awarded annually to a student who has given promise of sou citizenship and who submits the best printed and published evidence of abi in "forthright reporting" and good journalistic writing, in a student publicat or elsewhere.

Joshua Evans III Prize in Political and Social Sciences.—A memorial pr "established by friends because of an outstanding life." Awarded annually that man in the graduating class "who has demonstrated his signal ability the social and political sciences and who has given promise of the interpre tion of that ability in good citizenship among his fellows."

Willie E. Fitch Prize.—Established by James E. Fitch in memory of his s Awarded annually to a senior student for the best examination in chemist

Alice Douglas Goddard Prize.—A memorial established by Frederick Jose Goddard, of Georgetown, D.C. Awarded annually to the senior student maki the highest average in American literature.

Edward Carrington Goddard Prize.—Established by Mary Williamson Go dard, Alice Douglas Goddard, and Frederick Joseph Goddard, of Georgetow D.C., in memory of Edward Carrington Goddard, class of 1881. Awarded the junior or senior student making the highest average in the French langua and literature.

Morgan Richardson Goddard Prize.—A memorial established by Mary Williamson Goddard, Alice Douglas Goddard, and Frederick Joseph Goddard, of Georgetown, D.C. Awarded to the junior or senior student making the highest average in the following fields: business administration, economics, international business, or public accounting.

Government Employees Insurance Company and Affiliates Achievement Awards.—A $200 cash award is given in each of the following five areas: Health Care Administration, Management Science, Public Administration, Business Statistics, and Urban and Regional Planning.

Gardiner G. Hubbard Memorial Prize in United States History.—Established by Gertrude M. Hubbard in memory of her husband and awarded annually to that member of the graduating class majoring in history who has maintained the highest standing in courses in United States history.

International Business Prize.—Two prizes awarded annually by the School of Government and Business Administration to students specializing in international business, one awarded to a graduating senior and one awarded to a graduate student.

Kappa Kappa Gamma Prize.—Awarded annually to a full-time freshman or sophomore student for excellence in Biological Sciences 12.

David Lloyd Kreeger Prizes in Art.—Five prizes given by Mr. Kreeger, three in the fine arts and two in art history (including museology). Fine arts prizes are awarded to a senior or graduate student in painting, sculpture, and graphics or design. One prize in art history is awarded to a senior and one to a graduate student. Candidates for the prizes must submit original papers or works of art. Winners are selected by distinguished representatives of the field of art in the Washington, D.C., area.

Minna Mirin Kullback Memorial Prize.– Established in 1968 by Solomon Kullback in memory of his wife. Awarded annually by a committee of faculty members of the Department of Statistics to a full-time undergraduate or graduate student majoring in statistics, who will have completed 18 semester hours of statistics courses by the end of the spring semester.

John Francis Latimer Prize in Classics.—Established in 1973. Awarded to a graduating senior who has made the most outstanding record as a major in the Department of Classics.

Hilda Haves Manchester Prize in Sociology.—Established in honor of Hilda Haves Manchester, B.A. 1932, an outstanding student whose major field was sociology. Awarded annually by Columbian College of Arts and Sciences to the senior woman student majoring in sociology who has the highest scholastic record.

Vivian Nellis Memorial Prize.—Awarded to a student in the English Department who has shown special promise in the field of creative writing.

Phi Delta Kappa Prize.—Awarded annually by Beta Gamma Chapter to an outstanding senior in the teacher education program in the School of Education.

Phi Eta Sigma Prize.—A choice book selected from the field of the recipient's major, awarded annually by the George Washington University Chapter to the male student attaining the highest scholastic average in his first full semester of work. The winner's name is engraved on a plaque in the Office of the Dean of Columbian College of Arts and Sciences.

Pi Lambda Theta Prize.—Awarded annually by Alpha Theta Chapter to an

outstanding senior in the teacher education program in the School of E
tion.

Psi Chi Prizes.—Two prizes awarded annually by the George Washi
University Chapter to the best undergraduate student in experimental
chology and to the M.A. degree candidate or second-year graduate student
mitting the best thesis or research project in psychology.

Ruggles Prize.—Established by Professor William Ruggles in 1859, awa
annually to a candidate for a Bachelor's degree for excellence in mathem

Hermann and Johanna Richter Schoenfeld Prize.—Established in gra
appreciation of the inspired teaching and devotion to his students of Dr.
mann Schoenfeld, who for more than 20 years until his death in 1926 he
the Department of German. Hermann Schoenfeld, Ph.D., LL.D., was w
recognized as a scholar of distinction whose presence on the faculty a
prestige to the University. This prize is given annually to a member of
graduating class for excellence in historical and cultural phases of Ger
studies.

Society of Colonial Wars in the District of Columbia Prize.—A gold m
awarded to a candidate for a graduate degree who, in the judgment of the
ulty of the Department of History, submits a thesis or dissertation demons
ing excellence in historical research in American Colonial history. The Uni
sity reserves the right to withhold the award if no thesis or dissertation att
ing the required degree of excellence is submitted.

Staughton Prize.—Established by the Reverend Romeo Elton and awar
annually to the student making the best record in the most advanced course
the Latin language and literature.

James MacBride Sterrett, Jr., Prize.—Established in 1911 by Professor S
rett in memory of his son. Awarded annually to the student who obtains
highest average in Physics 1 and 2.

Charles Clinton Swisher Historical Club Prize.—Established in 1936 by
Charles Clinton Swisher Historical Club and augmented in 1941 by the bequ
of Professor Swisher. Awarded annually to the student who submits the b
essay covering some phase of medieval history.

James H. Taylor Graduate Mathematics Prize.—Established in memory
James H. Taylor, former Professor of Mathematics at the University. Award
annually to a graduate student for outstanding performance in mathemati

Benjamin D. Van Evera Memorial Prize.—Awarded annually to that Grad
ate Teaching Fellow in Chemistry selected as the most effective teacher duri
the current academic year.

The Wall Street Journal Leadership Prize.—Awarded annually to a gradu
ing senior in the Bachelor of Business Administration degree program f
outstanding leadership and service to the University.

Thomas F. Walsh Prize.—Established in 1901 and awarded annually to t
student who submits the best essay in Irish history.

The Washington Society of Investment Analysts Scholarship Fund.—A $5
award given annually to a candidate for the degree of Master of Busine
Administration in the field of Finance and Investments who is a U.S. citize
and whose career objectives are in the field of investment analysis, securiti
portfolio management, or related pursuits.

Alexander Wilbourne Weddell Prize.—Established in 1923 by Virginia Cha
Weddell in memory of her husband. Awarded annually to a candidate for

degree who writes the best essay on the subject of "the promotion of peace among the nations of the world." The prize essays shall become the property of the University and shall not be printed or published without the written consent of the University. The University reserves the right to withhold the award if no essay attaining the required degree of excellence is submitted.

Regulations

A STUDENT ENROLLED in the University is required to conform to the following regulations and to comply with the rules and regulations of the college, school, or division in which registered.

A student who withdraws or is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue work only under the regulations and requirements in force at the time of return.

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, the student's registration may be cancelled. If such falsification is discovered after the student has established an academic record at the University, the student may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Faculty) for subsequent registration in the University.

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered. Regular attendance is expected. A student may be dropped from any course for undue absence.

SCHOLARSHIP REQUIREMENTS

A student who fails to maintain the scholarship requirements of the college, school, or division in which registered may be dismissed from the University.

GRADES

Grades are mailed to the student through the Office of the Registrar at the close of each semester. They are not given out by instructors.

UNDERGRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit; *NC*, No Credit. Except for courses which specifically state that repetition for credit is permitted, a candidate for a degree at this University may not repeat

for credit a course in which a grade of *D* or better was received, unless quired to do so by the department concerned. A written statement to effect must be submitted to the Registrar by the appropriate department ch man.

GRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Minim Pass; *F*, Fail; *I*, Incomplete; *CR*, Credit; *W*, Authorized Withdrawal. Ex for courses which specifically state that repetition for credit is permitte candidate for a degree at this University may not repeat for credit a cours which a grade of *C* or above was received, unless required to do so by department concerned. A written statement to this effect must be submi to the Registrar by the appropriate departmental chairman.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Whenever a grade has not been assigned, the symbol *I* (Incomplete), the s bol *W* (Authorized Withdrawal) or the symbol *F* (Unauthorized Withdraw will be recorded. The symbol *I* indicates that a satisfactory explanation been given the instructor for the student's inability to complete the requi work of the course. At the option of the instructor, the grade of *I* may recorded if a student, for reasons beyond the student's control, is unable complete the work of the course, and if the instructor is informed of, approves, such reasons before the date when grades must be reported. grade may be used only if the student's prior performance and class atte ance in the course have been satisfactory. Any failure to complete the w of a course which is not satisfactorily explained to the instructor before date when grades must be turned in will be graded *F*. If acceptable reas are later presented to the instructor, that instructor may initiate an appropri grade change.

REMOVING AN INCOMPLETE

For information concerning the removal of a grade of Incomplete from a dent's record, consult the regulations of the college, school, or division c cerned.

THE QUALITY-POINT INDEX*

Scholarship is computed in terms of the quality-point index, obtained by div ing the number of quality points by the number of semester hours for wh the student has registered, both based on his record in this University. Qua points are computed from grades as follows: *A*, four points; *B*, three poin

* Applicable only to the Graduate School of Arts and Sciences, the School of Education, the Sc of Government and Business Administration, and the *graduate programs* in the School of Public International Affairs.

two points; *D*, one point; *F*, no points, for each semester hour for which e student has registered. Courses marked *W*, *I*, *NC*, or *CR* are not con- dered in determining the index, except that courses marked *I* will be con- dered when a formal grade is recorded. Grades in courses taken at another stitution are not considered in computing the quality-point index.

INAL EXAMINATIONS

inal examinations for undergraduate courses are scheduled at the end of each mester by the Office of the Registrar. Examinations for courses numbered 01 or above are scheduled, if desired, by the individual department or instruc- r.

CADEMIC DISHONESTY

he University community, in order to fulfill its purposes, must establish and aintain guidelines of academic behavior. All members of the community re expected to exhibit honesty and competence in their academic work. ncoming students have a special responsibility to acquaint themselves with, and ake use of, all proper procedures for doing research, writing papers, and aking examinations.

Members of the community will be presumed to be familiar with the proper cademic procedures and held responsible for applying them. Deliberate ailure to act in accordance with such procedures will be considered academic ishonesty. Acts of academic dishonesty are a legal, moral, and intellectual ffense against the community and will be prosecuted through the proper uni- ersity channels.

Copies of the University policy on academic dishonesty can be obtained rom the following offices: all department chairmen, all academic deans, and he Vice President for Academic Affairs.

WITHDRAWAL

Withdrawal from a course or from the University requires the permission of he dean of the college, school, or division in which the student is registered. Permission to withdraw from the University will not be granted a student who does not have a clear financial record (see "Payment of Fees").

Each college, school, and division of the University sets deadline dates for each semester concerning withdrawal. Withdrawal between these dates and the end of the semester is permitted only in exceptional circumstances.

All charges for courses dropped without the approval of the dean must be met by the student. Reporting the dropping of a course to an instructor does not constitute an official withdrawal.

CHANGES IN PROGRAM OF STUDY

Changes within a College, School, or Division.—A student may not substitute one course for another, drop courses (see "Withdrawal," above), change status from credit to audit or audit to credit without the approval of the dean of the college, school, or division in which registered.

Change from one section to another of the same course may be made w the approval of the dean and the department concerned.

Change from one major field to another within the same college or sch may be made with the approval of the dean. All requirements of the progr of study to which the change is made must be met.

Transfer within the University.— Application for transfer to another colle school, or division must be made to the appropriate admitting office on the fo provided by the deans concerned. Transfer from the appropriate preprofessio curriculum in Columbian College to bachelor's degree candidacy in the Sch of Education or the School of Public and International Affairs is effected up the completion of 60 or more semester hours of course work and of the nec sary procedures required by the particular school.

A maximum of 45 semester hours earned in the Division of University S dents may be applied toward a bachelor's degree in a degree-granting college school of the University. Work done in the Division of University Stude will not be counted toward a graduate degree unless prior written approv obtained from the relevant degree-granting college or school, has been filed the Office of the Dean of the Division of University Students (see page 19

Students transferring within the University are advised to study carefully graduate requirements enumerated below in this section under the headi "Graduation Requirements," and to note that, unless otherwise specified, in undergraduate divisions, 30 semester hours, including at least *12 semester ho* in the major field, must be completed while registered in the school or colle from which the degree is sought. Upon transfer the student should consult dean concerned and understand clearly the requirements he must fulfill.

CREDIT

Credit is given only after registration for a course and satisfactory complet of the required work, or upon the assignment of advanced standing in acco ance with the regulations of the several colleges, schools, and divisions.

Auditing.—A person who has been admitted to the University may registered, with the permission of the instructor, as an "auditor" in a class (academic credit). An auditor is not required to take active part or to p examinations. A student who takes a course as an auditor may not repeat later for credit.

POST-ADMISSION TRANSFER CREDIT

A student who plans to attend another institution and apply credit so earn toward graduation from this University must first secure the written approval his dean. In no event will credit in excess of what might be earned in a simil period in this University be recognized.

BALANCE SHEET

On request, the Office of the Registrar will issue to undergraduate degree can dates a balance sheet showing the amount of work completed and the requir ments remaining to be met for the degree. A second balance sheet is issu only if the student changes major or degree objectives.

ANSCRIPTS OF RECORD

ficial transcripts of student records are issued on written request of the dent or former student who has a clear financial record. A fee of $2 is arged for each transcript. When more than two transcripts are ordered at same time, a $2 fee is charged for each of the first two transcripts and a 0 fee is charged for each additional transcript.

NTINUOUS REGISTRATION

gree candidates are expected to maintain continuous registration until *all* de- e requirements are satisfied. Students who have completed their course re- irements (including the thesis) must maintain continuous registration by ying the "continuous registration" fee (see page 31). By failing to register one semester or more, the student breaks registration and must be re- mitted (see "Readmission," page 26). A "Readmitted Student" is subject the regulations and requirements in force at the time of readmission.

Students must be registered during the summer if they are taking courses, taking required examinations, are receiving guidance on theses or dis- tations, or are expecting to be graduated at the end of the Summer Sessions.

LITARY LEAVE

student called to active duty may be granted military leave for the period of ive duty, upon presentation to the dean of a copy of the military orders and etition for such leave. The maintenance of "continuous registration" is not quired of the student on military leave; however, the student must apply for dmission to the University well in advance of the semester of expected urn. Payments for tuition and fees which are not refunded to the student at time military leave is granted will be maintained as a deferred credit for student's account and used upon return to the University.

RADUATION REQUIREMENTS

egrees are conferred in February, May, and September.

To be recommended by the Faculty for graduation a student must have met admission requirements of the college or school in which registered; com- ted satisfactorily the scholarship, curriculum, residence, and other require- nts for the degree for which registered; and be free fom all indebtedness the University. Registration, either for course work or on the "continuous gistration" fee basis, is required for the semester or summer session at the se of which the degree is to be conferred.

Application for Graduation.—An "Application for Graduation" form *must* filed and the appropriate fee paid at the time of registration for the last se- ester or summer session of the senior or final year. Students completing de- e requirements during the Summer Sessions will be awarded diplomas (no rmal convocation) dated September 30, *provided* they have completed all gree requirements and have applied for graduation as a part of registration the Summer Sessions.

Scholarship.—The student must meet the scholarship requirements for the rticular degree for which registered.

Curriculum.—Minimum curriculum requirements for each degree are st under the college or school offering work in preparation for the degree.

Residence.—Unless otherwise specified, in all undergraduate divisions of University, *a minimum of 30 semester hours, including at least 12 hours in major field, must be completed while registered in the school or college f which the degree is sought.* This requirement applies to students transfer within the University as well as to students transferring from other institut Unless special permission is granted by the dean of the college or school cerned to pursue work elsewhere, the work of the senior or final year mus completed in the college or school from which the degree is sought.

The graduate student must meet the residence requirements for the partic degree for which he is registered.

National Teacher Examinations.—All candidates for the degree of Bach of Arts in Education are required to take the National Teacher Examinati

Attendance and Conduct.—The University reserves the right to refuse confer a degree upon a candidate whose attendance or conduct has been satisfactory.

Thesis or Dissertation.—A thesis or dissertation submitted in partial satis tion of requirements for a degree must be presented in its final form to dean of the college or school concerned no later than the date specified in University Calendar.

Accepted theses and dissertations, with accompanying drawings, become property of the University and are deposited in the University Library, w the duplicate copies are bound and made available for circulation. See appropriate college or school in this catalogue for regulations governing th and dissertations.

HONORS

WITH DISTINCTION

In all undergraduate divisions of the University a baccalaureate degree may conferred "With Distinction," at the discretion of the faculty, if a student m the specific requirements of the student's college or school as follows:

1. Columbian College of Arts and Sciences or School of Public and In national Affairs—the attainment of the grades of *A* in 60 per cent of courses taken at this institution; or

2. School of Education or School of Government and Business Admini tion—the attainment of a quality-point index of 3.50 or higher in all co work taken at this institution.

To be eligible a student must have completed at this institution at least half of the courses required for the degree.

SPECIAL HONORS

Special Honors may be awarded by the faculty to any member of the grad ing class for outstanding achievement in the student's major field on rec mendation of the major department. The student must fulfill all of the foll ing requirements:

1. Candidacy for Special Honors must be approved by the faculty mem representing the major department or field not later than the beginning of senior year.

. Such other conditions as may be set at the time the candidacy is approved
st be met.
. At least one-half of the courses required for the degree must have been
npleted at this institution.
. The specific requirement of the college or school in which registered must
fulfilled, as follows: (a) Columbian College of Arts and Sciences or
School of Public and International Affairs—attainment of the grades of
or *B* in 50 per cent of the courses taken at this institution; or (b) the
ool of Education or the School of Government and Business Administra-
—maintain a quality-point index of at least 3.00 on all course work taken
his institution.

ARTMENTAL HONORS

Department of History offers Departmental Honors if students meet specific
irements. For details, see the Department of History.

E LIBRARY

students registered in the University have the privilege of using the Uni-
ity Library. Its stacks are open, and all students are welcome to browse at
leisure. A card denoting approved enrollment for the current semester
t be presented when books are borrowed for outside use.
he loan period for stack books is 14 days. A fine of 25 cents is charged for
day a book is overdue. Any book which circulates is subject to recall by
Library if needed for reserve or other use. Reserve books must be used
he reserve reading room when the Library is open, except that they may
withdrawn for overnight use beginning at 8:30 p.m. A fine of 50 cents is
ged for each hour or fraction thereof that a reserve book is overdue.
des of a student are withheld until a student's library record is clear.
ll students using the University Library are expected to be familiar with its
iled regulations, available at any of the Library's service desks.

HT TO DISMISS STUDENTS

right is reserved by the University to dismiss or exclude any student from
University, or from any class or classes, whenever, in the interest of the
ent or the University, the University Administration deems it advisable.

HT TO CHANGE RULES

University and its various colleges, schools, and divisions reserve the right
odify or change requirements, rules, and fees. Such regulations shall go
force whenever the proper authorities may determine.

HT TO MAKE CHANGES IN PROGRAMS

right is reserved by the University to make changes in programs without
e whenever circumstances warrant such changes.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

The Family Educational Rights and Privacy Act of 1974 applies to institutio policies governing access to and release of student education records maintai by educational institutions which are recipients of federal funds. The Univer complies with this statute, which states, in part, that such institutions must

1. afford students access to education records directly related to them;
2. offer students an opportunity for a hearing to challenge such records inaccurate, misleading, or otherwise inappropriate;
3. receive the student's written consent before releasing information fr his or her education records to persons outside the University, except directory information as indicated below. Personally identifiable infor tion may be furnished to a student's parents without such written cons only upon certification of the student's financial dependency; and
4. comply with judicial order or lawfully issued subpoena to release a dent's record notifying this student of the action.

The University will release the following directory information upon requ address; telephone number; dates of attendance; school, college, or division enrollment; field of study; credit hours earned; degrees earned; and hon received. A student who does not wish such directory information relea must file written notice to this effect in the Office of the Registrar.

University guidelines on the release of student information may be obtai from the Office of the Registrar.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "L and Found" Office is maintained on campus in the Safety and Security Offi

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 561–62) contains regulations recently approved by University's Board of Trustees.

Consortium of Universities of the Washington Metropolitan Area, Inc.

THE UNIVERSITIES in Washington, D.C.—American University, Catholic U versity of America, *George Washington University*, Georgetown Univers and Howard University—are associated in a Consortium through which th coordinate the use of their respective facilities; District of Columbia Teach College, Gallaudet College, Mount Vernon College, and Trinity College associate members of the Consortium. Students in approved programs lead to degrees in any one of these institutions have the opportunity to select fr the combined offerings of all the particular courses which best meet th needs.

Participation is limited to campus degree candidates. The following, h

er, are excluded: students in canon law, dentistry, medicine, and theology. w students are also excluded from participation, except for candidates for e degree of Master of Laws at George Washington University and George-wn University.

In special courses involving private instruction (such as music or art) or torial study, if a special fee is charged, this fee is not covered by the Con-rtium agreement and must be paid by the individual student to the institution ministering the course. A student interested in registering for Reserve Officer aining Corps (ROTC) courses should consult the Registrar at the institution which the student is enrolled.

Students are encouraged to study the announcements of programs of all the rticipating institutions. See page 29 for information concerning registra-n for Consortium courses. *Students may not take courses at another insti-tion that are available at their own.*

Registration forms and instructions are available from the registrar of the stitution in which the student is enrolled. Students register and pay at their vn institutions for all Consortium courses.

The Speech and Hearing Clinic

Director of Speech Pathology and Audiology J.W. Hillis

HE SPEECH AND HEARING CLINIC offers diagnostic and remedial work for chil-ren and adults with such communication difficulties as stuttering, lisping, cleft-alate speech, and cerebral-palsied speech; and with voice, articulatory, and earing problems. Diagnostic and remedial work is also available for persons ith nonstandard language usage due to such conditions as hearing loss, brain amage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $35. Fees for additional specialized sting are dependent on the testing involved. The fees for individual speech r hearing therapy range from $4 to $25 a session. Fees are reduced for ull-time students enrolled in the University and for persons receiving group herapy. Fees are payable at the Office of the Cashier.

The Reading Center

Director F.E. Hesser

HE READING CENTER offers individual diagnostic and corrective services for all evels: primary, elementary, secondary, and adult. In addition, special reading mprovement classes are conducted for high school and college students as well as other adults.

A complete diagnosis includes psychological tests; vision, hearing, domi-ance, and spelling tests; and various types of reading achievement and apti-ude tests. Results are interpreted, and a written report is presented in con-erence with the parents or the individual.

The special reading improvement classes for high school students, co students, and other adults are offered throughout the year at stated inter Emphasis is placed on improvement of vocabulary, speed, comprehension, study skills. Instruction in spelling is also provided as needed. Mechanical such as the tachistoscope, rate accelerator, and controlled reader are avail for increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $125; for individual instruction, a lesson; for semi-individual instruction, $9 a lesson; for instruction in s groups, secondary level, $175 for 15 two-hour lessons. Reading classes two-hour sessions) are offered for adults, $175; for full-time George Wash ton University students and alumni, $65. Full-time staff employees may tact the Center regarding special fees. All fees are payable in advance at Reading Center.

Reading instruction is provided for first-year undergraduate students on basis of need.

Veterans Education

THE VETERANS COUNSELOR in the Office of the Registrar, Luther Rice Hall, 2 Eye Street, N.W., assists students entitled to educational benefits as vete widows, or children of deceased or totally disabled veterans with any prob which may arise concerning their benefits. This Office also processes certi tion of enrollment and attendance to the Veterans Administration so monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or dependent veterans should consult with the veterans counselor prior to submitting plication to the Veterans Administration. All such students should obtain instruction sheet issued by the Office of the Registrar, which sets forth req ments to be fulfilled before certification of enrollment can be made to Veterans Administration, and which includes other information of ge interest.

The Veterans Administration is at 941 N. Capitol St., N.E., Washin D.C. 20421.

Center for Administrative and Academic Computing

Director J.E. Smith

THE CENTER FOR ADMINISTRATIVE AND ACADEMIC COMPUTING is located on third floor of Lisner Hall, 2023 G St., N.W. The computer and other op tional supportive services are located on the first floor of Stuart Hall. 201 St., N.W. These facilities normally are available 24 hours a day, seven da week to all qualified faculty, staff and students.

The Center provides computational facilities and services to academic, earch and administrative users. The Center staff conducts seminars, con- ts with users and provides operational assistance as required. The central cessing unit is an IBM 370/145 with card reading capability, on-line disc rage, eight high speed and density tape units, two printers and remote entry vice for quick turnaround. The operating system is a modified OS/VS with st of the commonly used compilers and a large library of programs.

Computer programming courses are offered by the School of Government d Business Administration, the Department of Statistics, and the School of gineering and Applied Science. In addition, many other departments offer urses that utilize the computer as a research adjunct to course work.

Continuing Education for Women

NTINUING EDUCATION FOR WOMEN CENTER, Suite 621, University Library, ers individual and group counseling services as well as credit and noncredit urses and training programs. Brochures are available.

General Alumni Association

E OBJECTIVES OF THIS ASSOCIATION are to unite the graduates who wish to sociate themselves for charitable, educational, literary, and scientific pur- ses, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the Uni- rsity and who have left the University in good standing, or any person who or has been a member of the teaching, research, or administrative staff of the iversity, or of the Board of Trustees of the University. Active members are ose who are life members of the George Washington University General umni Association or the Alumni Association of any school of the University, are current contributors to the George Washington University Fund.

All alumni are urged to keep the Alumni Office informed of changes of ad- ess or occupation and to supply information with regard to their fellow umni. The Office is located in Alumni House, 714 21st Street, N.W., George ashington University, Washington, D.C. 20052.

English for International Students

rector G.R. Bozzini

E GEORGE WASHINGTON UNIVERSITY'S comprehensive program in English for ernational Students is designed as a service to persons enrolled or planning

to enroll in University credit programs, and to members of Washington's national community who wish to improve their command of English thr an intensive study program. In general, students must have completed equivalent of an American high school education.

Courses are offered at various levels of proficiency covering both oral written communication and are scheduled in 14-week sessions during the and spring semesters and for eight weeks during the summer. Students ent the program will take a battery of objective and non-objective placement to determine their levels of proficiency in English. Students must regist advance for the tests. Question regarding registration should be directe Susan Caron, Secretary, English for International Students, Stuart Hall 2013 G St., N.W., Washington, D.C. 20052. A $10 testing fee, payabl advance, is charged each student.

Persons writing from outside the United States and needing a student will be considered for I-20 validation only if they apply for admission degree program. Those interested in applying for a degree program should pages 26–28 for additional information.

UDENT LIFE

ie President for Student Affairs William P. Smith, Jr.
istant to the Vice President for Student Affairs John E. Perkins
ector of the Cloyd Heck Marvin Center Boris Bell
n of Students Marianne Phelps

OFFICE OF THE VICE PRESIDENT FOR STUDENT AFFAIRS develops student services, policies and procedures to complement the University's formal ruction program. These activities are implemented through the offices of Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Educa- al Opportunity Program, Housing, International Students, Student Activities, dent and Alumni Career Services and Student Health Service.

dent Services

FICE OF THE DEAN OF STUDENTS

n of Students Marianne Phelps
istant Dean of Students Gail Short Hanson

Office of the Dean of Students provides counseling and information to the eral student body and assists in program development on campus, particu- in the residence halls. The members of the staff of the Dean of Students ce are informed on University policies and student services provided on pus, enabling them to provide referrals and answers to many questions con- ing general student life. Personal letters of recommendation for students lying to graduate and professional schools can also be obtained from the n of Students Office. The Dean of Students works with the Adviser to rnational Students, the Director of the Counseling Center, the Director of Educational Opportunity Program and the Director of Housing in the lementation of their programs.

SING

ctor of Housing Ann Webster
stant Directors of Housing John Bohen, Marilyn Mundy, Michael Rabasca

plete information concerning the University's residence halls is available the Director of Housing, George Washington University, Washington, 20052. Information concerning off-campus housing near the University may be obtained at this Office.

Admission to the University does not include a room reservation. T
dent will receive, with his notification of acceptance, University residen
information, an application for residence hall space, and a declaration o
to attend the University. The application for residence hall space m
accompanied by a $100 *nonrefundable deposit*. The housing deposit is c
toward the first semester's room charge. Rooms are leased for the ac
year, and lease payment must be made by June 30 for the fall semester.

1976-77 RESIDENCE HALL RATES PER PERSON FOR TWO SEMESTERS*

For Men:

Calhoun Hall

double room
triple room

For Women:

Strong Hall

single room
double room
triple room

For Men and Women:

Crawford Hall (limited to sophomores, juniors, and seniors)—double room
Mitchell Hall (limited to sophomores, juniors, and seniors)—single room

Madison Hall

double room
triple room

Thurston Hall

double room, triple room, large room for four
suite for six

FOOD SERVICE

Resident freshmen and sophomores are required to participate in the service plan. Freshmen must participate in the seven-day, 20 meals per plan, at the rate of $800* for the academic year. Sophomores may elect the 20-meal plan or a five-day meal plan, 15 meals Monday through Fr for $750* for the academic year. Each plan is optional for junior, senior, graduate students. Food service payment does not cover University interse or vacation periods. All meal cards admit bearer to the dining room in Thu Hall and the second floor contract dining room in the Cloyd Heck M Center.

MUNSON HALL APARTMENTS

Munson Hall is a University-owned and operated apartment house conta 15 one-bedroom and 54 efficiency apartments. Graduate and married stu are eligible to reside in Munson Hall. Those wishing to apply for an apar

* Residence hall prices and allocation and food service prices subject to change.

ld contact the Housing Office for a waiting list application. All leases are 2 months.

CATIONAL OPPORTUNITY PROGRAM

ctor Abla Yvonne Thomas
nselor Ronald Whitmore

Educational Opportunity Program is designed to offer a college education harily to black and other minority students who are graduates of District olumbia high schools and/or other qualified District residents. It provides pportunity for a student to seek a degree in almost any field and at the e time receive academic and/or financial assistance.

NSELING CENTER

ctor E. Lakin Phillips
istant Director David L. Celio

Counseling Center works to enable the campus community to maximally fit from instruction by helping students overcome obstacles, anxieties, and fusions which hamper learning. Services are offered in three areas: (1) olution of the individual's educational, vocational, personal, or social prob- s through short-term individual or group counseling psychotherapy, voca- nal testing, or study skills remediation; (2) training graduate students, resi- nt assistants, and paraprofessionals, as well as consulting on mental health ics; and (3) developing innovative methods to aid student growth, such as diotaped information on undergraduate majors, counseling and therapy ough written communication, and videotaped counselor skills training.

The Center administers the Miller Analogies Test, admissions testing and cial assessments for business and industry. Through its Office of Com- nity Services, the Center also provides vocational counseling and educational grams to the community in general.

ees.—Students may request a cost-free interview between 9 a.m. and 0 p.m., Monday through Friday (except Friday mornings). If the student ides to continue the services offered, a fee of $5 per appointment will be rged for short-term treatment. If a test battery is called for, a flat fee of will be added. However, if financial need is a factor, fee adjustments can made.

The Counseling Center is located at 718 21st St., N.W.

ERNATIONAL STUDENTS

rnational House, located at 2129 G St. N.W., is the campus center for stu- ts from foreign countries. It serves also as the headquarters of the Inter- onal Students' Society, which seeks to promote international friendship and erstanding by welcoming to its membership students from all countries, uding those from the United States.

he International Student Adviser's Office is located in the International se. It is open each day throughout the school week for consultation on im- ration regulations and on any matters concerning the social and academic are of students from abroad.

CLOYD HECK MARVIN CENTER

Director Boris Bell
Assistant Director Donald Cotter
Accountant Johnnie Osborne
Operations Manager John Spaldo

The Cloyd Heck Marvin Center serves as the campus community center, viding services, conveniences, and recreational and social opportunitie students, faculty, staff, alumni, and guests. Its wide range of facilities pro the setting for a variety of programs conducted by the University Pro Board; the departments of Drama, Dance, and Music; and other student faculty organizations.

The Center Governing Board, representative of all elements of the Univ community, plays an important role in the day-to-day functioning of the Ce This Board works closely with the full-time staff in the development of cedures and policies which provide a framework for the Center's operati

STUDENT HEALTH SERVICE

Director Sal Fiscina, M.D.

The Student Health Service is an outpatient clinic designed to assist stu registered on campus with their health needs. It is located at 935 22nd S N.W. (in the H.B. Burns Memorial Building).

Physicians and physician assistants are available by appointment from 9 to 4:45 p.m., Monday through Friday. In addition, physician assistant available for primary care and triage to walk-in patients Monday through F from 5 to 6:45 p.m. and on Saturday from 9 a.m. to 12 noon.

For serious emergencies occurring during hours when the Student H Service is closed, students may go to the Emergency Room of the Univ Hospital for treatment. This arrangement is for emergency care only, an fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to r treatment at the Student Health Service. A student who is not current rolled or who has severed connection with the University is ineligible for cal benefits of the Student Health Service. Any student who so desires engage physicians and nurses of his or her own choice, but the student w responsible for all the fees charged. The bills incurred from all services dered outside of the Student Health Service (for example, x-ray work, la tories and referrals to specialists or other outside physicians) are the re sibility of the student.

HEALTH AND ACCIDENT INSURANCE

The Student Health Service has arranged for and endorsed group health accident insurance, on an elective basis, for those *full-time* students wh not have other coverage. Interested students should contact the Student H Service office.

UDENT AND ALUMNI CAREER SERVICES OFFICE

ector Gordon H. Gray
istant Director Cynthia Gurne
eer Services Counselor Paula Hoffman

Student and Alumni Career Services Office provides assistance to G.W.U. lents and alumni seeking full-time, part-time, temporary, or permanent ployment. All students are urged to become acquainted with the services his Office early in their college experience.

ounseling concerning trends in employment, areas of employment, various and examination announcements, preparation for job interviews, resume- ting, and other procedures for successful job application are always avail- e. Specific career openings; an on-campus recruitment program by business, ustry, government, and school systems; volunteer opportunities; and part- e and temporary jobs for students while attending school are all part of this vice. Teacher credential files initiated by persons seeking employment in all cational fields are maintained in this Office. Reference files for students plying to law schools, medical schools, or other graduate schools are main- ned.

An understanding and knowledgeable approach to avenues of service for se people who do not find career satisfaction in the structured systems of iness, government, and education is also provided in the Student and Alumni reer Services Office.

LIGIOUS LIFE

e University recognizes the contribution that religion makes to the life of its dents and encourages them to participate in the various religious organiza- ns of their own choice. Catholic, Jewish, and Protestant bodies sponsor ious groups and form a link between the University and the religious com- nity. The advisers of the religious organizations are available for counseling. Religious services in various traditions are provided regularly for the Uni- sity community as announced.

dent Activities

ector of Student Activities David Speck
istant Director—Orientation Leila Lesko
istant Director—Programming Rita Goldman
istant to the Director Theodora Frisby

offices of the Vice President for Student Affairs, the Dean of Students, the ector of the Cloyd Heck Marvin Center, and the Director of Student Activi- are responsible for all co-curricular phases of student life.

UDENT ACTIVITIES OFFICE

Student Activities Office assists individual students and organizations in gram development, campus leadership training, and participation in special ects—both within the University community and in the community at large.

This Office also serves as a central clearinghouse for development and m
tenance of a master activities calendar—for registering and assisting ca
organizations, for scheduling facilities (except in the Marvin Center) and ev
and for informing the University community of the many activities and
grams which can enrich the educational experience through a variety of we
monthly, and annual publications. The Student Activities Office is also re
sible for coordinating a comprehensive orientation program for new stu
entering the University. Students interested in participating in the many s
cultural, or extracurricular phases of University life should acquaint thems
with the facilities and functions of the Student Activities Office and its st

UNIVERSITY COMMITTEES AND ORGANIZATIONS

The George Washington University is an active, working community
student involvement has become a motivating force in the governance o
University through the committee structure. This involvement has h
develop policies and programs beneficial not only to the student popula
but to the total University community. While serving on these commi
student members participate in the formulation and the application of on
institutional policy.

There are numerous committees on which members of the student bod
able to serve. The Student Activities Office has a file on major commi
and interested students should inquire there for further information.
tional information is also contained in the *Student Handbook*. A brief de
tion of some of these committees follows:

Joint Committee of Faculty and Students.—This administrative comm
created in response to a resolution of the Faculty Senate, is composed of
faculty members, seven student members, and other ex officio members.
bers of this Committee are appointed by the President.

The Committee is officially charged to "facilitate all efforts to im
student-faculty relations," to "encourage student recommendations in all
of Senate policy-formulation which affect student life," and to "recom
changes in the 'Rules and Regulations Governing the Conduct of St
Life.'" The Committee has specific advisory powers in many areas conc
student-faculty relations and the interests of the student body.

Committee on the Judicial System.—The Committee on the Judicial S
is composed of three faculty members and three student members, one of
is the Chairman of the Student Court, one a student member of the St
Faculty Committee on Appeals, and one selected from the campus at
The Committee on the Judicial System works closely with the Exe
Secretary to the Judicial System to make sure that the various hearing b
are efficiently, fairly, and expeditiously conducting their business.

Other committees include the following: the Committee on University
ing, the Committee on Religious Life, the Committee on Sponsored Res
the Committee on Student Publications, and the Committee on the Univ
Bookstore.

STANDING COMMITTEES IN SCHOOLS AND COLLEGES

The schools and colleges maintain various standing committees con
with specific aspects of the college program; the majority are faculty

ees. One of particular interest to students, the Columbian College Advisory nmittee on Honors Program, includes three student representatives, gen-ly chosen from alumni of the sophomore-year honors program. This Ad-ry Committee selects leaders for honors seminars in the College, reviews pendent-study projects, and advises concerning the merits of these projects. tations to Committee membership are initiated by the College.

STUDENT NOMINATING BOARD

all-student board was created by the President upon the recommendation ne Joint Committee of Faculty and Students in February, 1971. The Board established "to make appointments to all University Committees that have ent members where there is no other existing means by or through organiza-l charter or constitution to do so."

ne members of the Student Nominating Board are the President of Mortar rd; the President of Omicron Delta Kappa; a student member of the Gradu-School of Arts and Sciences Advisory Council; and one representative each of the following: Residence Hall Association, Engineers' Council, Committee of Faculty and Students, Student Bar Association, and Asso-on of Medical Students.

PROGRAM BOARD

University Program Board, through its student committee structure and bership, provides a variety of cultural, social, and recreational programs ampus. As a result, students are afforded opportunities to broaden their ational experiences by developing and participating in those programs n contribute to the life of the University community.

dent membership on the Program Board is composed of four executive rs (Chairperson, Vice Chairperson, Secretary, Treasurer) elected from eneral student body in the spring semester, and five committee chair-e appointed after that election. The eight committees of the Program l are the Advisory Council, Art Gallery Committee, Concert Committee, Video Committee, Performing Arts Committee, Public Affairs Committee, e Relations Committee, and Special Programming Committee. These stu-work with appointed faculty members and professional staff from the on of Student Affairs in carrying out their many programs and activities.

ENT ORGANIZATIONS

llowing is only a partial sample of the organizations active at the Uni-during 1975-76. More complete information on these and other organi-s is available at the Student Activities Office.

MIC, DEPARTMENTAL, DIVISIONAL, OR SCHOOL ORGANIZATIONS

can Studies Club, Anthropology Club, Black America Law Students ation, Black Engineering Society, Engineer's Council, Enosinian Society, gma Phi, Geology Club, German Club, Health Care Administration t Association, Medical School Student Council, Philosophy Club, Russian Sociology Student Steering Committee, Student Bar Association.

HONOR SOCIETIES

Phi Beta Kappa.—A national honor society recognizing "outstanding lectual capacity well employed" in the field of liberal arts and sciences.

Sigma Xi.—A national scientific honor society, the purpose of which encourage original investigation in science, pure and applied.

Alpha Epsilon Delta.—A premedical honor society.

Alpha Sigma Lambda.—A national honorary society for outstanding lastic achievements in part-time, off-campus, evening programs.

Delta Phi Alpha.—A national German honor society.

Delta Sigma Rho-Tau Kappa Alpha.—A national forensic society.

Dobro Slovo.—A national Slavic honor society for graduate and underg ate students.

Howard F. Kane-A.F.A. King Obstetrical Society.—An honor so recognizing achievement among medical students in the areas of obste gynecology, and reproductive biology.

Mortar Board.—A national society for juniors and seniors stressing le ship, scholarship, and service.

Omicron Delta Kappa.—A national society emphasizing leadership in e curricular activities.

Phi Delta Kappa.—A national honor society recognizing and prom leadership in the field of education.

Phi Eta Sigma.—A national society, established to encourage and re high scholarship and attainment, membership in which is limited to those f men who attain a scholastic average of at least 3.50 or the equivalent.

Pi Delta Phi.—A national French honor society.

Pi Lambda Theta.—A national honor society recognizing excellence in s astic achievement and leadership among students in education.

Pi Mu Epsilon.—A national mathematics honorary.

Psi Chi.—A rational psychology fraternity.

Sigma Delta Pi.—A national Spanish honor society.

INTERNATIONAL AND CULTURAL EXCHANGE ORGANIZATIONS

East Asian Society, Friends of Canada, International Students' Society. American Association, Libyan Student Organization, Organization of Students, Polish American Youth Club, Students' Cultural Association India, World Affairs Society.

PERFORMING ARTS

GWU Dance Production Groups; Student Productions; University Cha Choir, Chorus, Orchestra; University Program Board; University Theatre variety of programs is presented by these groups throughout the academic

POLITICAL INTEREST ORGANIZATIONS

GW Ripon Society, GW College Young Republicans, GW Young Demo Young Americans for Freedom, Young Socialist Alliance.

ESSIONAL ORGANIZATIONS

a Chi Sigma (chemistry), Alpha Kappa Psi (commerce and economics), rican Society of Civil Engineers, American Society of Mechanical Engi-, Government and Business Administration Doctoral Association, Higher ation Association of GW, Institute of Electrical and Electronic Engineers, an Management Sciences and Business Administration Association, Per-l Society, Pre-Law Society, Pre-Medical Society, Phi Delta Epsilon (medi-raternity), Sigma Delta Chi (journalism), Student Planning Association, Tau (engineering).

ICATIONS AND COMMUNICATIONS

Cherry Tree (yearbook), *G.W. Forum* (student-faculty journal), *Potomac w* (publication of Consortium graduate students), *The Rock Creek* (liter-nagazine), ***Student Handbook, This Month*** (listing of major cultural s in the Washington area), *This Week* (weekly listing of scheduled events), *University Hatchet* (semi-weekly newspaper), WRGW (University radio n), 676-NEWS (recorded telephone message of daily University activi-

IOUS AND MEDITATIVE ORGANIZATIONS

t Student Union, B'nai B'rith Hillel Foundation, Christian Science Or-ation, Eastern Orthodox Fellowship, Eckankar Campus Society, Inter-y Christian Fellowship, Lutheran Student Association, Newman Founda-Psychegenics Club, Religious Society of Friends, Student International ation Society, Unitarian-Universalist Club, United Christian Fellowship, y Foundation.

CE ORGANIZATIONS

K, Ecology Action, GW Medical Aid, Project Share, St. Elizabeths al Project, SERVE, Student Housing Project, Student Volunteer Action il.

L FRATERNITIES

Tau Delta, Kappa Sigma, Sigma Alpha Epsilon, Sigma Chi, Sigma Nu, Phi Epsilon, Tau Kappa Epsilon. The Interfraternity Forum coordinates erest and concerns of some of the fraternities on campus.

L SORORITIES

Gamma, Delta Sigma Theta, Kappa Kappa Gamma, Phi Sigma Sigma. hellenic Council includes representatives of sorority chapters at the Uni-.

AL INTEREST AND ADVOCATE GROUPS

Peoples' Union, Jewish Activist Front, Legal Aid Bureau, Peoples' Union, Public Interest Research Group (GW Chapter), Student Recruitment ittee.

SPORTS, HOBBIES, RECREATIONAL ORGANIZATIONS

Amateur Radio Club, Cheerleaders, Collegiate Bowling Club, Folkdance
Hockey Club, Military Collectors, Philubious Eggworte (music).

Athletics and Intramural S

The University is a member of the National Collegiate Athletic Associ
the Eastern College Athletic Conference, the Association for Intercoll
Athletics for Women and the Eastern Association of Intercollegiate Ath
for Women. Its teams participate against major universities throughou
Midwest and Eastern Seaboard. The intercollegiate programs for me
women offer such sports as basketball, baseball, soccer, tennis, golf, wre
crew, cross country, swimming and diving, squash, badminton and volley

The University offers a broad program of intramural sports activities fo
men and women through the Department of Human Kinetics and L
Studies.

Major Program E

Art Exhibits.—The work of locally, nationally, and internationally
artists is shown in monthly exhibits in the Dimock Gallery in Lisner L
and in the art gallery of the Cloyd Heck Marvin Center. With the coope
of the Curator of Art, an annual student art exhibit is presented.

Concert Series.—The Department of Music presents a series of concert
turing faculty, guest and student artists throughout each year.

Dance.—The GWU Dance Company presents major concerts, inf
studio performances, experimental events, television appearances and le
demonstrations. Students may audition to become company members and
the opportunity to choreograph, perform and gain experience in the tec
aspects of dance productions.

International Programs.—The International Students' Society presents a
nual International Dinner in cooperation with foreign embassies and in
tional restaurants. Other programs include regular forums and speake
international topics.

Orchestra and Chorus Concert Series.—The University Orchestra and C
are two facets of the lively arts available to students either as credit cour
as extracurricular activities. The Chorus presents major performances f
University community three or four times a year, including regular winte
spring concerts. The University Orchestra presents several performance
nually.

Program Board Series.—The University Program Board sponsors co
and lectures each semester at which nationally known personalities appe

Recreation Program.—The new Charles E. Smith Center for Physical E
tion and Athletics offers many facilities for student use. The University Re
tion Association and the Department of Human Kinetics and Leisure St
arrange a wide variety of sports and recreational activities and special e
for all students.

heatre.—The University Theatre produces four or five major plays and icals during the year on the new proscenium/thrust stage in the Dorothy s Marvin Theatre or in Lisner Auditorium. Additional works, including inal and experimental plays, are produced in a more intimate studio theatre. lents have the opportunity to participate in all aspects of theatre and may ive credit toward their B.A. or M.F.A. degrees for some of their production k.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

Dean C.D. Linton
Assistant Deans B.J. Dunham, J.L. Métivier, Jr., R. C. Rutledge, H.E. Yeide, Jr.

FACULTY*

Professors E. Abravanel, J.G. Allee, Jr., J. Aschheim, F. Belaunde-Terr
Bergmann, L.S. Bowling, H.F. Bright, L.W. Brown, R.G. Brown, J.F. B
K.A. Burnim (*Research*), W.E. Caldwell, G.V. Carroll, I.H. Cisin,
Coates, J. Cornfield, T.F. Courtless, Jr., R.H. Davison, L. De Alessi,
DePauw, A.H. Desmond, J. Eisenstein, N. Filipescu, J.A. Frey, R.N.
Jr., J.L. Gastwirth, M. Gordon, S.W. Greenhouse, F.S. Grubar, A. Gy
R.C. Haskett, P.H. Highfill, Jr., P.P. Hill, J.W. Hillis, H.C. Hinton,
Hobbs, M.A. Holman, C. Hsieh, W.A. Johnson (*Research*), R.G. Jones,
Kendrick, R.W. Kenny, H. Kenyon, Y. Kim, J.C. King, A.D. Kirsch, D.
ger (*Research*), R.M. Krulfeld, E. Langhans (*Research*), T.Z. Lavine,
LeBlanc, L.P. Leite (*Emeritus*), S. Levitan, B.I. Levy, J.B. Levy, R.K. L
H.W. Lilliefors, C.D. Linton, T.P.G. Liverman, W.A. MacDonald, N. M
(*Research*), G.E. Mazzeo, R.B. McKay (*Research*), M.L. Meltzer,
Métivier, Jr., F.H. Michael, C.C. Mondale, R.H. Moore, J.A. Morgan,
J.N. Mosél, D. Nelson, B. Nimer, K.F. Parker, R. Parris, T.P. Perros,
Phillips, F. Prats, R.E. Purcell, J.P. Reesing, Jr., B. Reich, W.M. Rey
C.E. Rice, J.W. Robb, H.M. Sachar, B.M. Sapin, R.H. Schlagel,
Schwoerer, W.E. Schmidt, R.P. Sharkey, L. Shaw (*Research*), C. Shih,
Shumway, F.R. Siegel, D.E. Silber, H. Solomon, G. Steiner, R.W. Step
E.L. Stevens, C.T. Stewart, Jr., T. Suranyi-Unger, Jr. (*Research*), C. T
G. Teleki, K. Thoenelt, R.B. Thompson, R. Thornton, R.C. Vincent,
Walk, R.H. Walker, Jr., D. Wallace, Jr., R.L. Weintraub, E.R. Weism
D.G. White, R.E. Wood, H.B. Yacobson, H.E. Yeide, Jr., A.J. Zuche
Adjunct Professors T.E. Bowman, J.C. Broderick, R.F. Caron, T.F. Ca
F.A. Chace, Jr., J.L. Fisher, J. Grunwald, F. Gutheim, M.L. Jones,
Kauffman, L.S. Kornicker, R. Manning, J.B. Margolin, C.G. McWr
R.P. Multhauf, J.W. Pierce, H.A. Rehder, I.G. Sohn, P. Swamy, N. Tu
Associate Professors D.L. Atkins, R.L.A. Bari, J.R. Barth, L.S. Bielski, M.D
Brewer, A.D. Britt, E.A. Caress, A.E. Claeyssens, Jr., M.A.B. Coff

* The President of the University, the Vice President for Academic Affairs, the Registrar of the versity, the Director of Admissions of the University, and the University Librarian are ex members of the Faculty of Columbian College of Arts and Sciences.

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INTRODUCTION

ce its founding in 1821, Columbian College of Arts and Sciences, the liberal college of the University, has continued to expand and develop with the of Washington. Its central situation makes participation in the life of the ion's capital convenient for resident students. The cosmopolitan nature of student body reflects the atmosphere of a great world capital. Because the lents come from the 50 states and from 90 foreign countries, class discussions and casual student conversations are enriched by a challenging variety viewpoints.

Throughout its history, the College has kept pace with, and often led, movents of reform in higher education. Sensitive to the rapidly changing patterns student and social needs, notably the increasing maturity and knowledge of modern incoming freshman, the College has inaugurated sweeping changes its academic programs. In brief summary, the changes are designed to permit the able student to earn the baccalaureate degree in less than standard four years, either by earning credit through a wide variety of minations or by performing with excellence within a 90-semester-hour three-r program; (2) provide each student with a greater opportunity to design individual academic program by eliminating almost all specific course requirents except in the major field; (3) encourage an early and close association ween the student and individual faculty members in the field of the student's ef interest; and (4) foster a spirit of community and shared responsibility ween faculty and student.

Opportunities exist for double majors within the College; interdisciplinary grams; and, in the case of the student who finds no existing major or program suitable to individual educational goals, special interdisciplinary programs which may be developed by the student, in consultation with departntal advisers and with the final approval of the Committee on Programs.

Columbian College offers programs leading to the degrees of Associate in ts, Bachelor of Arts, and Bachelor of Science; prelegal and premedical grams; the first two years of the professional programs in education and in blic and international affairs.

Columbian College has degree-granting authority over certain prog which combine on-campus and off-campus courses, including the Bachel Science in Geodetic and Cartographic Science (areas of concentration in tography and geodesy) and the Bachelor of Science in Oceanography. As of the courses in the first two years of these programs are offered on ca students may be admitted as full-time on-campus students in Columbian lege. After the first 64 hours, most of the courses are offered at off-ca locations. Students are then required to register for their coursework the College of General Studies, which administers off-campus programs. dents attending off-campus classes are expected to provide their own tran tation to and from class. Distances involved vary from two to 20 miles the campus area. Columbian College also has degree-granting authority two other programs which are offered off campus and administered b College of General Studies: Associate in Arts in General Studies and Bac of General Studies (areas of concentration in economics, history, law enf ment, mathematics, political science, psychology, and sociology). For fu information in all these programs, see the *College of General Studies* catal

THE COLUMBIAN COLLEGE PROGRAM

The Columbian College program is a contemporary application of the his liberal arts tradition. Its purpose is to enable the student to develop particular abilities and general awareness as a human being. It demand the student a thorough acquaintance with one major area of learning a the same time an understanding of how that specialization fits into the context of the scientific, social, and moral problems which confront m society. It stresses not merely expertness but that broadly enlightened ex ness which encourages its graduates to grow through the years in ability wisdom.

SOPHOMORE YEAR IN PARIS PROGRAM

Freshmen who have received grades of *C* or higher in all course work d the first semester may be eligible to participate in the George Washi University-American College in Paris Sophomore Year in Paris Prog Qualified students will be encouraged to accept this opportunity to profit the cultural and intellectual riches of Europe by spending their second living and studying in Paris. Credits earned in this Program will be tra rable toward a degree in Columbian College of Arts and Sciences. Sin courses are taught in English, a knowledge of French is not mandatory, b desirable.

General Information

ENTRANCE REQUIREMENTS

GOOD CHARACTER and an academic background appropriate for the progra studies contemplated are required.

Requirements for admission to the freshman class are as follows:
. An acceptable certificate of graduation from an accredited secondary ool, showing at least 15 units* which must include four years of English; east two years of one foreign language; two years of science, preferably n laboratory instruction; two years of social studies, one of which must be erican history; and two years of college preparatory mathematics.
. The principal's statement that the applicant is prepared to undertake col- work.
. College Entrance Examination Board scores submitted on the Scholastic itude Test and the English Composition Achievement Test.
is recommended that the examinations be taken in December or January. es on tests taken in the junior year may be submitted. Arrangements for are the responsibility of the applicant and should be made with the Edu- onal Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947 ter Street, Berkeley, Calif. 94704, not less than one month before the date ne test. In applying for the test, the applicant should specify that the scores ent to the Office of Admissions, George Washington University, Washing- D.C. 20052.
he College Entrance Examination Board tests are preferred; however, the erican College Testing battery scores will be accepted. The applicant should est that these scores be sent to the Office of Admissions directly from the erican College Testing Program, Iowa City, Iowa. It is recommended that applicant take the tests in October of the senior year.
he Committee on Admission and Advanced Standing will consider the ade- y of the qualifications of an applicant who, because of unusual circum- es, does not present all of the formal requirements stated on pages 72–73. Committee may prescribe appropriate scholastic-aptitude tests of the ersity. Students admitted with deficiencies in secondary school units will equired to begin removing such deficiencies within the first year, by appro- e courses or examinations.

GULATIONS

ulations regarding ADMISSION, REGISTRATION, FEES AND FINANCES *are stated ages 21–34; other University regulations, on pages 45–52.*

OLARSHIP REQUIREMENTS

DEMIC WORK LOAD

ncourage academic performance of high quality, the student's work load nited.
full-time student not on probation may take a course load of as much as emester hours. A student employed more than 20 hours a week who is on probation may take not more than 10 hours.
he amount of work taken by a student on probation may be limited by the mittee on Scholarship.
full-time student who, during the immediately preceding semester, has ved no grades below *B* and has earned grades of *A* in three courses totaling

nit represents a year's study in a secondary school subject, including in the aggregate not less 20 sixty-minute periods, or the equivalent, of prepared classroom work.

at least 9 semester hours may take 18 or 19 hours. An employed student during the immediately preceding semester, has received no grades belo and has earned grades of *A* in two courses totaling at least 6 semester h may take 12 hours.

A student who accepts employment after registration or at any time d a semester must report that fact immediately to the Dean so that the acad program may be adjusted, if necessary.

ATTENDANCE

The student is held responsible for all the work of the course in which t tered, and all absences must be excused by the instructor in charge b provision is made for the student to make up work missed.

USE OF CORRECT ENGLISH

The use of correct English, oral and written, is required in all courses. student whose English in any course whatever is deemed unsatisfactory m reported by the instructor to the Dean and to the Committee on the U Correct English. The Chairman of the Committee may assign supplem work, without academic credit, varying in amount with the needs of the dent. If the work prescribed is equivalent to a course, the regular tuitio is charged. The granting of a degree may be delayed by failure to mak any such deficiency in English to the satisfaction of the Committee an Dean.

HONORS

Sophomore Honors Program.—Columbian College offers an honors pro for selected sophomores. The program is designed to provide an appro challenge and opportunity for gifted students; to permit early identificati students with the highest potential for high-quality graduate work and su in competitive award programs; to introduce educational innovations may possibly be applied at a later date to the student body at large; to together a group of students whose activities will enable them to contr more significantly to academic discussion within the University as a and to involve superior students in a program unmistakably identified wit liberal arts ideal of the generally educated person, thus balancing the emp on concentrated study that is the heart of existing departmental honors grams.

The program normally consists of two honors seminars, each limite approximately 15 students. Each seminar carries 3 semester hours of and represents elective hours in the student's program. Directors of the sem invite expert faculty members from different fields to assist in discussi particular problems. Students may elect a program of independent stu place of the second seminar.

Participants in the Honors Program are selected at the end of their firs on the basis of an application to the program. All students who earn four or *B* or better in their first semester are automatically eligible to apply. students doing high-quality work may apply on the recommendation of t their instructors.

he designation "sophomore honors" is entered into the student's perma-
t record if the student (1) completes successfully 2 semesters of honors
k and (2) earns grades of *B* or better in 16 courses during the first two
rs of study.

Dean's List.—The name of every student who takes a minimum of 15 semes-
hours (none of which may be in credit/no credit courses) in any one
ester, who receives grades of *A* in at least 60 per cent of the course work
en in that semester, and who has no grades below *B* for that semester, is
ed on the Dean's List for that semester.

ADEMIC STANDING

tudent who is not suspended or on probation is considered to be in good
ding.

he following rules governing probation and suspension are applicable as
ed to students enrolled for a full-time program (12 semester hours or more)
ing the fall or spring semester. Students enrolled for less than 12 semester
rs during the fall or spring semester and students enrolled during the sum-
sessions are subject to probation or suspension on the basis of their record
four courses (3 or more semester hours of credit each), or multiples thereof,
er than on their record in any one semester.

BATION

tudent who in one semester receives two grades of *F* in courses carrying
more semester hours of credit each, or the equivalent, is placed on proba-
. A student in the first semester on probation who receives one grade of *F*
uch a course will be continued on probation for a second semester. Two
des of *D* will be treated as equivalent to one grade of *F* in determining pro-
on. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a
of the record for the semester during which the *I* is removed. A student on
bation taking 12 or more semester hours whose grades are all *C* or better is
oved from probation.

PENSION

tudent who in one semester receives grades of *F* in three courses carrying
more semester hours of credit each, or the equivalent, is suspended. A
dent in the first semester on probation who receives two or more grades of
n such courses is suspended. A student who receives one or more grades
F in such courses in any later semester on probation is suspended. Two
des of *D* will be treated as equivalent to one grade of *F* in determining sus-
sion. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a
of the record for the semester during which the *I* is removed.

he minimum period of academic suspension is one fall or one spring se-
ter. Final dates for applying for readmission are the same as those gov-
ng "Undergraduate Admission" (see pages 21–22). A suspended student
king readmission must submit evidence to the Committee on Admission
Advanced Standing of conduct during absence from the University which
cates that the student will profit from readmission. A student suspended
e for poor scholarship will not be readmitted.

MID-SEMESTER WARNING

When, at the end of the sixth week of each semester, instructors file in the of the Dean the names of freshman and sophomore students who are unsatisfactory work, a notice of Warning is sent to the student and a filed with the appropriate adviser. A "Warning" constitutes notice to the dent to consult the instructor and adviser at the earliest opportunity.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized drawal) may be assigned are described on page 46.

Removing an Incomplete.—The grade of *I* must be removed no later tha last day of the examination period for the fall or spring semester immedi following the semester or summer session in which the grade of *I* is assi An "Incomplete" that is not removed within this period is automatically cha to an *F*. In cases of well-documented extenuating circumstances, an instr and a student may jointly petition the Dean, or the appropriate committee additional time in which to complete the work of the course. Such peti should be submitted within the same period. The grade of *I* cannot be rem by reregistering for the course here, or by taking its equivalent elsewhere.

CORRESPONDENCE AND HOME-STUDY COURSES

No credit is given for work done by correspondence or in home-study cou

CLASSIFICATION OF STUDENTS

A *freshman* is a student who has completed less than 30 semester h A student becomes a *sophomore* upon completion of 30 semester hours. A dent become a *junior* upon completion of 60 semester hours. A student comes a *senior* upon completion of 90 semester hours.

An *unclassified student* is one who is not a candidate for a bachelor's d (normally because the student already holds one), but who wishes for academic reason to take a limited program for a limited time. Registrati this status is permitted only with the prior approval of the appropriate D Council.

ADVISORY SYSTEM

Each student is provided with both academic advising and personal couns *Academic* advising is performed by members of the faculty selected for knowledge of academic programs, and each student, before registration, m up a program in consultation with the adviser assigned. A student wh *not* selected a major field receives academic advising from a member o Columbian College Committee on Student Advising (see page 70). A st who has officially declared a major field receives academic advising from appropriate department, or from an interdepartmental committee. *Per* counseling is available through the Office of the Dean of Students or thr the University Counseling Center. All students are encouraged to ma close contact with their advisers.

tudents who intend to transfer after the sophomore year to the School of ıcation or the School of Public and International Affairs are assigned special isers to assist them in planning their programs.

An academic warning system permits early attention to students whose work s below required standards. In such cases, students are asked to consult ılarly with their advisers. On request, and with the student's permission, ies of academic warnings or probation notices may be sent to parents or rdians, who are themselves welcome to meet with members of the advisory f.

ADEMIC ADVISING CENTERS

h Department has set up Academic Advising Centers where both general cational counseling and specific major-field advising are available to stu-ts. The locations and hours of these Centers may be obtained from depart-ıtal offices.

As the freshman student deliberates choice of a major, he or she should sult with faculty advisers in as many of these Centers as he or she wishes. ce a major is officially declared, the student then receives all academic nseling from the Advising Center of the major department.

CLARATION OF MAJOR

student is encouraged to select and officially declare a major field early, nally no later than the end of the freshman year. All students, however, ther they are entering freshmen or transfer students, who have declared a or, must secure the proper form from the Office of Columbian College, it to the Academic Advising Center of the chosen major field, secure the ature of the student's adviser and return the form to the Office of Colum-ı College. No student is considered to have a major until this process is pleted. Thereafter, the student receives academic guidance from a faculty ıser in the major-field department.

LUMBIAN COLLEGE GENERAL COURSE REQUIREMENTS

candidates for the degree of Bachelor of Arts or Bachelor of Science are itted to a general arts and sciences curriculum until they declare a major . Except for two general course requirements, all curriculum requirements ing to the degrees of Bachelor of Arts and Bachelor of Science are estab-ed by the various major field departments or programs.

he two general requirements are the following:

. Each student must, during the freshman year, demonstrate adequate evement in the field of English Composition, either by examination or by ng Engl 9 or 10, and Engl 11 or 12. This requirement may not be post-ed.

. Each student at some point in the college career must undertake a "mean-ul initiation" into the three divisions of knowledge: Humanities, Natural Mathematical Sciences, and Social Studies. As each major field will nally represent one of these three areas, the requirement may be fulfilled aking no less than 6 semester hours in each of the other two areas. These

6 credits may be in approved introductory courses, or in approved adv courses if the student is qualified and receives the instructor's permi Applied and "tool" courses do not satisfy the requirement for "meaningful i tion" into the Humanities. All science courses taken in fulfillment o "meaningful initiation" requirement must include laboratory instruction. mally, these 6-hour units must be taken in a single subject or depart Courses simply waived (no credit assigned) cannot satisfy the "meani initiation" requirements. Columbian College departments and program listed below under the three categories.

*Humanities	Natural and Mathematical Sciences	Social Studies
Art	Biological Sciences	American Civilizatio
Classics	Chemistry	Anthropology
East Asian Languages and Literatures	Computer Science	Economics
English	Geology	Geography and Regional Science
Germanic Languages and Literatures	†Mathematics	History
Music	Physics	Journalism
Philosophy	Statistics	Political Science
Religion		Psychology
Romance Languages and Literatures		Sociology
Slavic Languages and Literatures		
Speech and Drama		

REQUIRED PLACEMENT EXAMINATIONS

English.—Students whose College Board English Composition Achieve Test scores suggest that they will benefit from more intensive training in positional skills may be assigned to Engl 9 or may be tested in vocabu spelling, grammar, standard usage, and writing skill before placement in Engl 9 or 10. Students whose scores indicate superior competence will b lowed to waive the Engl 10 requirement. Those whose scores indicate mar superior competence will be allowed to waive both Engl 10 and Engl 11 o

Foreign Languages.— A student who has not been granted advanced sta and who wishes to continue in college the language begun in high school take a placement examination in one of the following: Chinese, French, man, Greek, Hebrew, Italian, Latin, Russian, or Spanish. Upon complet the examination, assignment is made to the appropriate course.

Mathematics. New students accepted for registration in Math 30 ar quired, prior to registration, to take a placement examination in algebra trigonometry; those accepted for registration in Math 51 are required, to registration, to take a placement examination in algebra.

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* Basic language courses (normally the first two years) are considered "tool studies" and a acceptable in fulfillment of "meaningful initiation" into the Humanities. Similarly, applied in art and music are not acceptable in fulfillment of this requirement.

† Math 3, 6 and 30 are not acceptable in fulfillment of "meaningful initiation" into the Natura Mathematical Sciences.

OREIGN LANGUAGE REQUIREMENT

most major programs requiring foreign languages a student must complete tisfactorily the equivalent of two years of college work in a single foreign nguage.

A student offering for admission four acceptable high school units of a sin- e foreign language, or the equivalent, is not required to take any foreign lan- uage.

A student who offers less than four units and wishes to continue the same nguage must take the language placement test.

In many instances foreign languages are required or recommended as eparation for advanced work. The student should consult the adviser so that ppropriate foreign languages may be included, when necessary, in the stu- nt's program.

IRST- AND SECOND-GROUP COURSES

irst-group courses, those numbered from 1 to 100, are intended primarily r freshmen and sophomores. Second-group courses, those numbered from 01 to 200, are intended for juniors and seniors. However, a qualified freshman sophomore may, with the permission of the adviser and of the department ncerned, take second-group courses. Such qualification is achieved by passing waiving introductory courses or prerequisite courses in the first group.

OURSES IN THE MAJOR FIELD OR DEPARTMENT

very student is given the opportunity of taking a wide range of liberal arts bjects—Humanities, Natural and Mathematical Sciences, Social Studies—th as a means of laying the groundwork for more concentrated major- ld study and as a means of determining what academic area is best adapted the student's interests and aptitudes. In order to enhance this opportunity d to avoid over-specialization once a major has been selected, at least 60 urs of course work, including the general course requirements of Columbian ollege, must be taken outside the major-field department or major program.

ROFESSIONAL COURSES

cept for majors in Applied Mathematics and for students intending to apply r the combined degree of Bachelor of Arts and Doctor of Medicine, no more an 12 hours of professional courses, e.g., courses offered in units of the niversity other than Columbian College, may be included in the hours re- ired for the bachelor's degrees in Columbian College. Students electing pro- sional courses under this rule must obtain the approval of the Dean before gistration.

XPERIMENTAL HUMANITIES/SERVICE-LEARNING PROGRAM

maximum of 21 semester hours in any combination of Experimental Hu- anities courses and Service-Learning Program courses may be credited to- rd Bachelor's degrees in Columbian College.

EARNING CREDIT BY EXAMINATION

Assuming there is no duplication of coursework earned, a maximum o semester hours of credit may be assigned for any combination of the lowing:

College Entrance Examination Board Advanced Placement Tests.—C may be granted for college-level courses taken in an approved secon school if substantiated by satisfactory performance on the Advanced Place Tests. See page 23 for further details.

College Entrance Examination Board College-Level Examination Prog (CLEP).—Prior to matriculation credit may be assigned for CLEP Ge Examinations, with the exception of the English Composition Examina passed at the 50th percentile or above. Credit may be assigned for any C Subject Examinations passed at the level recommended in the College B model policy.

After matriculation credit for CLEP Subject Examinations will not be signed without special authorization by the Columbian College department erning the subject involved. See pages 23–24 for additional information.

Special Departmental Examinations.—A student may request any departm of Columbian College to offer the student a special examination covering subject matter of any specific course. (If an appropriate CLEP Subject Ex nation is available the department may choose to employ it.) Approval such a request is not automatically granted; the student must offer evidence sufficient background to have a reasonable command of the subject matter student who has previously taken examinations to waive course requirem may not subsequently take examinations for credit in the same courses. As ing credit (or waiving a requirement) by special departmental examinat will depend on the department's evaluation of the examination paper. Th examinations will normally be of at least three hours' duration. A fee of for each course examination is charged for preparation, administration grading of the examination.

WAIVING INTRODUCTORY COURSES BY EXAMINATION

Placement Tests.—Many departments in Columbian College, including E lish, mathematics and all foreign languages, *require* students to take Placem Tests to determine level of proficiency or eligibility for specified courses. student is placed in an appropriate course on the basis of these tests. There no charge to the student for Placement Tests, and no credit (advanced st ing) is awarded for courses bypassed or waived as a result of these tests.

Waiver Examinations.—Several departments in Columbian College, includ English, history and sociology, offer periodic Waiver Examinations for in ductory courses. Such examinations may be attempted at the option of student; a fee of $5 is charged. Specific departments should be consulted further details. *Passing a Waiver Examination does not entitle a student to semester hours of credit.*

professional Requirements

DENTS WHO PLAN TO MAJOR in any program offered by the School of Edu-n or the School of Public and International Affairs are registered during freshman and sophomore years in Columbian College. Requirements for first two years of these programs, as well as requirements for the pre-ical program, are listed on the following pages.

EMEDICAL CURRICULUM

remedical student who intends to work toward a bachelor's degree fulfills two general requirements of Columbian College (see pages 77–78), and follow the major field curricula of any Columbian College department. h premedical program must be approved by the premedical adviser. For hission to most medical schools the student must have a minimum of 90 ester hours applicable towards a degree in an approved college of arts sciences and the 90 hours must include

- **Biology:** 8 semester hours. This may be either in general biology or zoology may *not* include separately credited courses in botany.
- **Chemistry:** 8 semester hours of general inorganic chemistry (which may in-e qualitative analysis), including 4 semester hours of laboratory; and 6 to 8 ester hours of organic chemistry, including laboratory.
- **Physics:** 8 semester hours, including at least 2 semester hours of laboratory.
- **English:** 6 semester hours. This may be the usual introductory college course ts equivalent.

Many medical schools have additional entrance requirements, among which courses in biochemistry, embryology, histology, genetics, and mathematics. en where such courses are not actually required, they are strongly recom-nded.

With the exception of these specific requirements applicants are urged to low their personal interests in developing their premedical courses of study. well-balanced program, rather than a specific field, is the criterion by which applicant is judged. It is not advisable to take courses that appear to cover ject matter in the medical program.

While well-qualified candidates are eligible for admission after completing minimum 90 semester-hour requirement, the majority of applicants are nd to be better prepared for the study of medicine after four years of lege work.

DUCATION CURRICULUM

st two years in preparation for the Bachelor of Arts in Education degree in School of Education:

		Semester Hours
Engl:	Composition—Engl 9 or 10, 11	6
	Literature—Engl 51–52, 71–72, or 191–92	6
Math:	Two semesters to supplement senior high school courses, chosen from Math 3, 6, 9, and 10	6

HKLS:	Any combination of first-group courses in the Department of Human Kinetics and Leisure Studies
Psyc:	Psyc 22
	Psyc 29 (for elementary majors) or 112 (for secondary majors)
Science:	Three semesters (2 in biological science and one in physical science or vice versa) to supplement senior high school courses in those fields, chosen from BiSc 3–4 or 11–12; Chem 3–4 or 11–12; Geol 1–2; or Phys 1 and 2, or 9–10. A secondary education major offering for admission 2 or more acceptable senior high school units in the above areas of science may be exempted from one semester of this requirement
Social Studies:	Hist 71–72, or PSc 4 and 6 or 5 and 6
	Six semester hours selected from one of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; PSc 4 and 6; PSc 5 and 6; or Soc 1 and 2
SPDR:	SPDR 1 (or 11, if the Department so advises)
Elective:	
	Total

HUMAN KINETICS AND LEISURE STUDIES CURRICULUM

First two years in preparation for the Bachelor of Science in Human Kinetics and Leisure Studies degree with Specialization in Elementary or Secondary Human Kinetics and Leisure Studies in the School of Education:

Engl:	Engl 9 or 10, 11
HKLS:	Any combination of first-group courses in the Department of Human Kinetics and Leisure Studies
Psyc:	Psyc 22
	Psyc 29 (for elementary majors) or 112 (for secondary majors)
Math/Science:	BiSc 3–4; Chem 3–4; Geol 1–2; Math 9 and 10; or Phys 1 and 2, or 9–10
Social Studies:	12 semester hours selected from any two of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Hist 39–40; Hist 71–72; PSc 4 and 6; PSc 5 and 6; Soc 1 and 2
SPDR:	SPDR 1 (or 11, if recommended by the Department)
Elective:	
	Total

First two years in preparation for the Bachelor of Science in Human Kinetics and Leisure Studies degree with a Specialization in Dance in the School of Education:

Engl:	Engl 9 or 10, 11
HKLS:	Any combination of first-group HKLS courses numbering 10–57, and/or HKLS 121* and 123†
	HKLS 107, 157

* May be repeated once for credit.
† May be repeated for credit not to exceed four semester hours

		Semester Hours
Psyc:	Psyc 22, 112	6
Math/Science:	BiSc 3–4; Chem 3–4; Geol 1–2; Math 9 and 10; or Phys 1 and 2, or 9–10	6–8
Social Studies:	Hist 71–72, or PSc 4 and 6 or 5 and 6	6
	Six semester hours selected from one of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; PSc 4 and 6; PSc 5 and 6; or Soc 1 and 2	6
SPDR:	SPDR 1 (or 11, if recommended by the Department)	3
Elective:		18
	Total	62–64

INESE LANGUAGE AND LITERATURE*

e first two years in preparation for the Bachelor of Arts degree with a major Chinese Language and Literature in the School of Public and International airs consists of a minimum of 60 semester hours. Each student must, during freshman year, demonstrate adequate achievement in the field of English mposition, either by examination or by taking Engl 9 or 10, and Engl 11 or Either while in Columbian College or the School of Public and International airs, the student must also undertake a "meaningful initiation" into the three sions of knowledge: Humanities, Natural and Mathematical Sciences, and ial Studies. As the major field represents one of these three areas, the uirement may be fulfilled by taking no less than 6 semester hours of ap- ved introductory courses, or 6 semester hours in approved advanced rses if the student is qualified and receives the instructor's permission, in Natural and Mathematical Sciences and in Social Studies. Students must ude in their program of study Chin 1-2, 3-4, and 9; Chin 7-8 and 9; or n 5-6. Chin 5-6 is preferred.

ST ASIAN STUDIES OR TERNATIONAL AFFAIRS CURRICULUM

st two years in preparation for the Bachelor of Arts degree in the field of t Asian Studies (China and Japan) or International Affairs in the School Public and International Affairs:

		Semester Hours
Engl:	Engl 9 or 10, and 11 or 12	6
Humanities or AmCv:	Art 31–32 or 71–72: †Literature (American, Chinese, East Asian, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-	

e degree of Bachelor of Arts with a field-of-study major in Chinese Language and Literature is available in Columbian College of Arts and Sciences (see page 80).
† If a student elects 6 semester hours of literature in any foreign language, this cannot be used to satisfy the language requirement.

	group Philosophy courses; Rel 21, 59–60; or AmCv 71–72
*Language:	Chinese, Japanese, French, German, Hebrew, Italian, Russian, or Spanish
Math/Science:	BiSc 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10; or one course selected from Stat 51, 53, 91, and one course selected from Stat 97, 105, 111
Social Studies:	Econ 1–2; Hist 40 and 72; PSc 4 and 6 or 5 and 6
†Elective:	
	Total

PUBLIC AFFAIRS CURRICULUM

First two years in preparation for the Bachelor of Arts degree in the fi Public Affairs in the School of Public and International Affairs:

Engl:	Engl 9 or 10, and 11 or 12
Humanities or AmCv:	Art 31–32 or 71–72; *Literature (American, Chinese, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; or AmCv 71–72
Language or Statistics:	NOTE: This requirement may be satisfied by 2 years of one foreign language‡ or 12 semester hours of Statistics. Statistics courses taken to fulfill this requirement may not also satisfy the Math/Science requirement below.
Math/Science:	BiSc 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10; or one course selected from Stat 51, 53, 91, and one course selected from Stat 97, 105, 111
Social Studies:	Econ 1–2; Hist 40 and 71–72; PSc 4 and 6 or 5 and 6
‡Elective:	
	Total

URBAN AFFAIRS CURRICULUM

First two years in preparation for the Bachelor of Arts degree in the fie Urban Affairs in the School of Public and International Affairs:

Engl:	Engl 9 or 10, and 11 or 12
Humanities or AmCv:	Art 31–32 or 71–72; Literature (American, Chinese, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; or AmCv 71–72

* Chin 5-6 is required for East Asian Studies (China focus) majors. Japn 3-4 is required Asian Studies (Japan focus) majors. Greek and Latin are not acceptable for International majors.
‡ Greek and Latin not acceptable for Public Affairs majors.
† Credit is not given for courses elected in the department of human kinetics and leisure studies

		Semester Hours
lath/Science:	BiSc 3–4 or 11–12; Chem 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10	6–8
	NOTE: If a student elects two years of a foreign language, two semesters of Statistics courses may be substituted for the Math/Science requirement.	
ocial Studies:	Econ 1–2, Hist 71–72, and PSc 4 and 6 or 5 and 6	18
	Six semester hours selected from the following: Hum 40, 51–52, Soc 2	6
*Elective:	Students may substitute some of the required courses for the major (see page 182) for elective courses during the sophomore year	16–18
	Total	60

gree Programs

OCIATE IN ARTS DEGREE

ASSOCIATE IN ARTS DEGREE may be granted to a student who has completed emester hours in arts and sciences with acceptable grades, and who has ful- d the general requirements described on pages 77–78. In addition, the degree be awarded to Pre-Education and Pre-Public and International Affairs stu- ts upon completion of the curriculum specified for the first two years of the ropriate program. The last 15 semester hours of the program of study st be completed in residence in Columbian College. A student wishing to ive this degree must file an "Application for Graduation" form and pay $10 graduation fee at the time of registration for the semester or summer ion in which the requirements will be completed.

E BACHELOR'S DEGREES

umbian College offers programs leading to the degrees of Bachelor of Arts Bachelor of Science.

n cooperation with the School of Medicine and Health Sciences a seven-year riculum leading to the combined degrees of Bachelor of Arts and Doctor of dicine is offered.

uirements for the Degrees

OLARSHIP

ne hundred and twenty hours of course work must be passed and a quality- t index of 2.00 achieved in courses graded on a four-point scale. At least hours of course work, including the general course requirements of Co- bian College, must be taken outside the major-field department or major gram.

he index is obtained by dividing the number of quality points by the nber of semester hours of courses passed with grades of *A*, *B*, *C*, or *D* ch the student submits for graduation. Both the number of quality points

and the number of semester hours of courses are based on the s record at this University. The index is computed as follows: *A*, four po three points; *C*, two points; *D*, one point; for each semester hour wh student has taken. Courses marked *F*, *W*, *I*, *NC*, or *CR* are not consid determining the index, though courses passed with *CR* count toward th hour overall requirement. (When a formal grade is recorded for an plete, a grade of *D* or better will be included in the computation of dex.) A grade of Incomplete which is not removed within one seme automatically changed to an *F*. Grades earned in courses taken at a institution are not considered in computing the index. See page 90 for s ship requirements applicable specifically to Departmental Majors.

RESIDENCE

For the Standard 120-semester-hour Program.—A minimum of 30 se hours, including at least 12 hours in the major field, must be comple residence in Columbian College. *Unless special permission is granted Dean to pursue work elsewhere, the work of the senior year must be com in residence.* This requirement applies to students transferring within the versity as well as to students transferring from other institutions.

For the 90-semester-hour Program.— The last 60 semester hours, incl at least 12 hours in the major field, must be completed in residence in C bian College.

Summer work may be counted in residence. For regulations governing st who are absent from the University for one semester or more, see "Conti Registration," page 49.

CURRICULUM REQUIREMENTS

A change in degree candidacy within Columbian College (e.g., from Ba of Arts to Bachelor of Science) requires the permission of the Dean. degree requirements effective at the time the change is approved must be

First-group courses may be required as prerequisites to the major because of their introductory character they cannot be counted as part o programs. (See "Explanation of Course Numbers," pages 209–10.)

CREDIT/NO CREDIT OPTION

A junior or senior student in Columbian College who is in good standing with the approval of his adviser and the Dean, take one course a semester receive a grade of *CR*, Credit, or *NC*, No Credit. No student will be allow take more than four credit/no credit courses under this regulation. The st may, however, in addition receive grades of *CR*/*NC* in the proseminar for of-study majors and in other courses normally using such grades. A student sign up for the credit/no credit option at registration. Under no circumst may a student change from credit no credit status to graded status, o versa, after the end of registration. Courses required in the student's field (courses required in the major department or those required outside major department) may not be taken on the credit no credit basis. A tra

nt may not choose this option until the second semester of his enrollment is University.

ORIAL STUDY

nior or senior of demonstrated capacity, with a special interest in the ect matter of a *regularly listed course*, may be permitted to take tutorial *in residence* under the personal direction of the instructor, in accordance the rules of the appropriate department and with the approval of the n. Credit under this plan is limited to the specific semester hours of credit gnated for each course in the list of courses of instruction. It assumes uent and regular conferences between the student and instructor.

Standard 120-Semester-Hour Program

hundred and twenty semester hours of course work are required for duation. At least 60 hours of course work, including the requirements stated ages 77–78, 85–86, must be taken outside the major department or pro-n. The student should consult the adviser at each registration about choice ourses.

ach student should declare a major as soon as possible, preferably by completion of the 30th semester hour. A student may change the major with the consent of the Dean and of the department or committee con-ed, and the student must meet the requirements for the new major in effect e time the change is approved.

udents transferring from other institutions or from other schools, colleges, ivisions in this University, with major requirements wholly or substantially must satisfy the residence requirement of Columbian College (see page

90-Semester-Hour Program

90-semester-hour degree program is designed for the exceptionally able nt. This program, which leads to the regular Columbian College degrees, es it possible to graduate in three normal academic years with a total of emester hours of credit instead of the standard 120. Students in this pro-must complete all of the requirements for the three-year degree in the ster in which the 90th semester hour is achieved.

e requirements for this program are (1) 90 semester hours of credit d in college courses (that is, the 90-hour requirement may not be re-d by credit earned through examinations); (2) completion of the chosen r-field program and general curricular requirements; (3) grades of *A* in st 45 semester hours of course work and *no* grades below *C*; (4) at least mester hours of credit earned in 100-level courses; and (5) recommenda-f the major department or program.

be eligible for this program, the student must show evidence of excep-academic ability by college record, performance in college courses, and appropriate information.

interested student should make application directly to the major-field tmental chairman or program director as soon as possible, preferably

by the end of the first year of study. The student's academic record to t
will, of course, provide a useful criterion of eligibility.

A transfer student may qualify for graduation under the 90-hour
provided the student satisfies the residence requirement of Columbian
(see page 86), earns grades of *A* in no less than 45 semester hours
work at this University and has no grades below *C*.

A student who fails to maintain the required academic performan
studying toward the 90-hour degree program simply continues for the
120-hour degree.

Bachelor of Arts

The Bachelor of Arts degree is offered in the following fields:

American Civilization
American Literature
Anthropology
Applied Mathematics
Applied Statistics
Art History
Biology
Botany
Chemistry
Chinese Language and Literature
Classical Archaeology and
  Anthropology, studies in
Classical Archaeology and
  Classics, studies in
Classical Humanities
Dramatic Art
Economics
English Literature
Environmental Studies
Fine Arts
French Language and Literature
Geography
Geology
Germanic Languages and Literatures
History
Journalism
Judaic Studies
Latin American Studies
Mathematical Statistics
Mathematics
Music:
  Applied Music
  Music History and Literature
  Music Theory
Philosophy
Physics
Political Science
Psychology
Religion
Russian Language and Literature
Russian Literature and Culture—in Tra
Sociology
Spanish American Literature
Spanish Language and Literature
Speech Communication and Broadcastin
Speech Pathology and Audiology
Statistics (Computer Science option)
Zoology

Combined Degrees of Bachelor of Arts and Doctor of Medicine

A candidate for the combined degrees of Bachelor of Arts and Doctor of
cine must (1) complete the entrance requirements for the Doctor of Me
degree in the School of Medicine and Health Sciences; (2) complete the
requirements stated on pages 77–78, 85–86; (3) accumulate 90 semester
in the liberal arts, including a minimum of 30 in second-group cour
Columbian College; (4) obtain the approval of the Dean of Columbian C
at the time of entering the School of Medicine and Health Sciences; (5)
the recommendation of the Dean for Academic Affairs of the Medical
at the completion of all prescribed courses in the first year of the Sch
Medicine and Health Sciences, at which time the degree of Bachelor o
will be conferred (professional work taken at another institution wi

fy the major requirement of the combined degrees); (6) maintain through-
the entire course the scholarship level required for graduation.

elor of Science

Bachelor of Science degree is offered in the following fields:

Applied Mathematics
Applied Statistics
Biology
Botany
Chemistry
Environmental Studies
Geology
Geology (Engineering option)
Mathematical Statistics
Mathematics
Physics
Zoology
Statistics (Computer Science option)

Undergraduate Major

re are two types of undergraduate majors: the Field-of-Study Major and Departmental Major. Five majors, Classical Archaeology and Anthropogy, Classical Archaeology and Classics, Environmental Studies, Judaic dies, and Latin American Studies, although interdepartmental in nature, are erned by the regulations of the Departmental Major.

LD-OF-STUDY MAJOR

h Field-of-Study Major covers a carefully worked out field of coordinated dy and is under the supervision of the appropriate department and the lumbian College Committee on Studies.

The Field-of-Study Major requires no specific program of courses, although student is required to meet the over-all general requirements for the de-e. Ability to pass the Major Examination is assumed to be a convincing nonstration that the student possesses the breadth, depth, and quality of owledge of the major usually defined in terms of semester hours, courses, and ides. Information on each field is obtainable from the department. Immeiately upon declaring a major, students should consult the appropriate de-rtment so that they may be assigned an adviser.

The Field-of-Study Major places special emphasis on the intellectual develment of the individual student. Programs in the same major may vary, pending upon the individual student's background, previous study, and apti-es. The student is expected to consult the adviser frequently, and the special oseminar offered in some fields gives the student further opportunity for indi-ual advice and direction in pursuing a program especially adapted to indi-ual needs and abilities. A close student-adviser relationship is essential for student's success under the Field-of-Study Major plan.

The following Field-of-Study Majors are offered: American Civilization, nerican Literature, Chinese Language and Literature, English Literature, ench Language and Literature, History, Religion, Russian Language and erature, Russian Literature and Culture—in Translation, Spanish American erature, Spanish Language and Literature.

Proseminar in the Major.—A proseminar is offered in most fields to help the dent acquire a coordinated knowledge of the chosen field through reading, dy, and laboratory exercises. It is a presentation of the content and methods

of the major field as a whole through the organization and coordination knowledge obtained in the various formal courses in the major subject material not usually included in such courses. This course is not required, it is elected, strict attendance is essential. Six semester hours, but no qual grade, may be assigned. When registered in this course, the student h privilege of visiting, subject to the approval of the instructor, any oth propriate course offered in the College. (Regular attendance in a course, for credit or as an auditor, requires registration and payment of tu Proseminars are open only to the student who has been accepted as a date under that specific major.

The Major Examination.—The Major Examination will normally be at the close of the senior year; a student on a limited schedule may take earlier than one calendar year before graduation. A student who fails t a Major Examination may, at the discretion of the Committee on Studi re-examined at a later regular major-examination period. The Committ Studies has general supervision of the preparation, reading, and gradi Major Examinations. Major Examinations are held each semester on fixed by the department or departments concerned, but in no case later December 1 for the fall semester, April 13 for the spring semester August 26 for the summer sessions.

DEPARTMENTAL MAJORS

Departmental Majors, unlike Field of Study Majors, are defined in ter credit hours, required courses, and the attainment of grades no lower th in the minimum required second-group courses taken in the major field. A required course will satisfy a curricular requirement in the major, but i not count toward the minimum number of hours required in the major department may require a degree candidate to repeat a required cour which a *D* was received. See page 46.) The minimum specific re ments for Departmental Majors are listed below the staff of instruction department concerned. The Chairman of the Department, or designated partmental adviser, should be consulted at registration concerning the dent's program of courses; and the entire program, including electives, be approved by the Department. The student is also expected to consul Chairman or adviser in all matters affecting the program of studies, su changes, substitutions, or withdrawals, and especially concerning the stu progress in a course. A close student-advisor relationship is desirable.

Departmental Majors are offered in the following: American Literature thropology, Applied Mathematics, Applied Statistics, Art History, Bi Botany, Chemistry, Classical Archaeology and Anthropology (interde mental), Classical Archaeology and Classics (interdepartmental), Classica manities, Dramatic Art, Economics, English Literature, Environmental St (interdepartmental), Fine Arts, Geography, Geology, Geology (engine option), Germanic Languages and Literatures, History, Journalism, J Studies (interdepartmental), Latin American Studies (interdepartmen Mathematical Statistics, Mathematics, Music (Music History and Liter Music Theory, Applied Music), Philosophy, Physics, Political Science, chology, Russian Language and Literature, Sociology, Speech Communic and Broadcasting, Speech Pathology and Audiology, Statistics (Comp Science option), Zoology.

BLE MAJORS

the prior approval of the departments concerned, a student who com-
s the requirements of two major fields in Columbian College (for ex-
e, mathematics and physics, or English and Latin, or history and eco-
ics) may graduate with a double major. Such a student should consult
advisers in the two departments concerned and officially declare both
rs on the appropriate forms available in the Dean's Office. A double
r must be taken in departments offering the same degree (either the B.A.
e B.S.); a major field in Columbian College cannot be combined with a
r field offered by another degree-granting unit of the University.

RDISCIPLINARY PROGRAMS

gular Interdisciplinary Programs.—Several programs presently exist, in-
ng American Civilization, Classical Archaeology and Anthropology, Classi-
rchaeology and Classics, Environmental Studies, Judaic Studies, and Latin
rican Studies.

ecial Interdisciplinary Programs.—A student who finds no existing major
ogram suited to individual educational goals may develop a special major
ram, in consultation with appropriate departmental advisers. Final ap-
al of such a program rests with the Committee on Programs. Only pro-
s with valid and clearly defined academic goals will be approved, and
shall be designated by a title suggested by the student to the Committee
rograms for approval. Because of their broad scope, such interdisciplinary
rs may not be combined with a double major.

student in an interdisciplinary program will be expected, during the second
ster of the senior year, to take a comprehensive examination (either oral
itten) in the interdisciplinary field, or to undertake a senior comprehensive
, at the discretion of the student's interdepartmental committee.

GRADUATE SCHOOL OF ARTS AND SCI

Dean H

Assistant Deans A.D. Andrews, E.A. Caress, D.

FACULTY AND CONSUL

FACULTY*

Professors E. Abravanel, L.F. Affronti, F.D. Allan, J.G. Allee, Jr., R.C
J. Aschheim, J.M. Bailey, O. Bergmann, L.S. Bowling, H.F. Bright
Brown, R.G. Brown, J.F. Burks, W.E. Caldwell, G.V. Carroll, M.M.
I.H. Cisin, A.G. Coates, V.H. Cohn, Jr., J. Cornfield, T.F. Courtle
R.H. Davison, L. De Alessi, L.G. DePauw, A.H. Desmond, J. Eise
N. Filipescu, J.A. Frey, R.N. Ganz, Jr., J.L. Gastwirth, M. Gordon
Goss (*Visiting*), S.W. Greenhouse, F.S. Grubar, A. Gyorgy, R.C. H
P.H. Highfill, Jr., P.P. Hill, J.W. Hillis, H.C. Hinton, H.H. Hobbs,
Holman, J.C. Houck, C. Hsieh, R. Hugh, T.N. Johnson, R.G. Jones
Kendrick, R.A. Kenney, R.W. Kenny, H. Kenyon, Y. Kim, J.C. King
Kirsch, R.M. Krulfeld, T.Z. Lavine, H.L. LeBlanc, L.P. Leite (*Emer*
S. Levitan, B.I. Levy, J.B. Levy, R.K. Lewis, H.W. Lilliefors, C.D.
T.P.G. Liverman, W.A. MacDonald, H.G. Mandel, P. Mazel, G.E. M
M.L. Meltzer, F.H. Michael, J.W. Millar, F.N. Miller, Jr., C.C. Mc
J.A. Morgan, Jr., J.N. Mosél, D. Nelson, B. Nimer, K.F. Parker, R.
T.P. Perros, V. Petrov, E.L. Phillips, F. Prats, R.E. Purcell, J.P. Reest
B. Reich, C.E. Rice, J.W. Robb, M.L. Robbins, H.M. Sachar, B.M
R.H. Schlagel, W.E. Schmidt, L.G. Schwoerer, R.P. Sharkey, R.H. Shu
F.R. Siegel, G. Sigur, D.E. Silber, B.W. Smith, R.S. Snell, H. So
G. Stambuk, J.E. Starrs, G. Steiner, R.W. Stephens, C.T. Stewart, Jr.
Straw, C. Taam, G. Teleki, K. Thoenelt, R.B. Thompson, R. Thornton
Tidball, M.E. Tidball, C.R. Treadwell, E.B. Truitt, Jr. (*Research*),
Vahouny, R.D. Walk, R.H. Walker, Jr., D. Wallace, Jr., R.L. Weit
E.R. Weismiller, M. Werner, D.G. White, R.E. Wood, H.B. Yak
H.E. Yeide, Jr., A.J. Zuchelli

Adjunct Professors T.E. Bowman, J.C. Broderick, F.A. Chace, Jr., R.G. C
E.G. Kauffman, C.G. McWright, J.W. Pierce, H.A. Rehder, I.G. Sohn

* The President of the University, the Vice President for Academic Affairs, the Registrar
University, the Director of Admissions of the University, and the University Librarian are
members of the Faculty of the Graduate School of Arts and Sciences.

ociate Professors F.P. Abramson, E.N. Albert, Y. Al-Doory, D.L. Atkins, L.A. Bari, J.R. Barth, A.D. Britt, E.A. Caress, M.B. Coffland, R.M. Dunn, C.F. Elliott, R.S. French, I.I. Glick, R.S. Goldfarb, V.K. Golla, M.D. reen, W.B. Griffith, S.E. Haber, R.A. Hadley, D.R.K. Henney, C.J. Herber, J. Hiltebeitel, R.W. Holmstrom, K. Huang, R.L. Humphrey, Jr., C.T. eland, M.J. Jackson, W.R. Johnson, H.D. Junghenn, S.A. Karp, I. Katz, G. Kent, N.K. Khatcheressian, P.D. Kind, P.F. Klarén, P. Klubes, R.E. nowlton, M.J. Koering, R.A. Lavine, M. Lee, D.R. Lehman, P.H.M. engermann, J.F. Lewis, C.A. Linden, R.C. Lindholm, J.M. Logsdon, W.F.E. ong, J.C. Lowe, G. Ludlow, J.H. Maddox, J.J. McMillan, H. Merchant, M. Mergen, C.A. Moser, N. Natov, H.R. Nau, G.A. Olkhovsky, R.K. acker, W.C. Parke, C.H. Pfuntner, J.A.A. Plotz, J.A. Quitslund, M. Reich, A. Rowley, P.G. Sáenz, S.O. Schiff, S.L. Simons, C. Steiner, D.H. Teller, Thompson, N.A. Tilkens, C.E. Tuthill, G.A. Walker, R.A. Wallace, D.W. Watkins, S.J. Wayne, R.Y. Yin, B.C. Zook

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* President of the University and the Vice President for Academic Affairs are ex officio members e Dean's Council.

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H. Weissbach, S.H. Weitzmann, R. Wittler, M.L. Wolbarsht, O. Yen
Young, L.E. Zimmerman

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A. Jabbour, J.B. Kuiper, P. Lundeberg, V. McKay, R. Sauer, J.W. With

HISTORY AND ORGANIZA

The Graduate School of Arts and Sciences is responsible for advanced
and research leading to Master's degrees and the degree of Doctor of Ph
phy in the arts and sciences. Graduate programs at George Washingto
versity were first formally organized under a graduate School in 1905, f
ing several decades of gradual growth in a number of departments. In
the Graduate School was discontinued. Columbian College, the Univ
liberal arts college, then assumed responsibility for the Master of Art
Master of Science degrees, and a newly created Graduate Council ad
tered all Doctor of Philosophy programs. Professional schools took res
bility for advanced degrees in the professional fields.

In 1967 the Graduate Council and the Graduate Division of Colu
College were consolidated into a new Graduate School of Arts and Sc
All graduate programs in the arts and sciences leading to the degrees of Ma
of Arts, Master of Arts in Special Studies, Master of Fine Arts, Mas
Forensic Sciences, Master of Music, Master of Science, Master of Scien
Teachers, Master of Science in Forensic Science, Master of Science in S
Studies, and Doctor of Philosophy are under the Graduate School.

In addition, a Master of Philosophy degree is awarded by the School,
recommendation of the appropriate department, to students who have su
fully completed the General Examination for the Doctor of Philosophy d

The School is under the direction of the Graduate Faculty of Arts an
ences. It is the responsibility of the Faculty to set the requirements for
sion to the School, to provide courses and programs of study and resea
its students, to establish academic standards for its degrees, to recomm
the Board of Trustees the awarding of degrees, to lay down regulatio
needed for the operation of the School, and generally to supervise its act

The administration of the School is vested in the Dean, who is Chairm
the Dean's Council, which is responsible to the Faculty of the School f
policy matters.

ADMISSION REQUIREMENTS

Application forms for admission to graduate study are obtained from the O
of the Dean of the Graduate School of Arts and Sciences. When comp

application forms must be submitted to this Office, together with college scripts and letters of reference.

pplicants must have academic backgrounds of excellence, usually with ma- or equivalent, in the fields in which they intend to study for advanced ees. Normally, a *B* average (or equivalent) from an accredited college is ired. With evidence of special promise, such as high Graduate Record mination scores, an applicant may be accepted whose academic record short of *B*. The minimum does not assure automatic acceptance. The rtments may, and often do, set higher admission standards. Moreover, number of spaces available for new graduate students limits the number can be accepted. Students who apply in their senior year must have com- ed their baccalaureate work before registration in the Graduate School and t present evidence of such completion. Students whose native language is English are required to take the *Test of English as a Foreign Language* OEFL), administered by the Educational Testing Service, Princeton, N.J.

pplication for Admission.—Applicants who are requesting fellowship sup- t must submit completed applications by February 15 (February 1 for stu- ts in clinical psychology and art therapy) for admission in the fall semester by November 1 for admission in the spring semester. Applicants for the campus Master of Arts in Special Studies must have all application material the Graduate School office by July 15 for the fall semester, November 1 the spring semester and April 15 for the summer sessions. Applications graduate study without fellowship support made after these dates are eptable for admission in the corresponding semester and will be reviewed ime permits and if space is available in the program desired. More time n normal may be required to process applications submitted during July d August.

Readmission.—A student who has failed to maintain continuous registration wishes to resume a graduate program must file an application form to considered for readmission. Readmission is not guaranteed, and the appli- ion is subject to review by the department concerned and the Dean. The dent may be required to take qualifying examinations on the course work npleted. Application forms are available in the Graduate School Office.

GULATIONS

ulations regarding ADMISSION, REGISTRATION, FEES AND FINANCES *are stated pages 21–34; other University regulations, on pages 45–52.*

n addition, the Graduate School publishes a Student Handbook each aca- ic year which contains updated information on the School's policies, regu- ons, and other matters of concern to enrolled or admitted students. It is the onsibility of the student to be aware of the information contained in the logue and handbook.

des

des for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, ; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit.

he symbol *I* (Incomplete) indicates that a satisfactory explanation has been n to the instructor for the student's failure to complete the required work

for a course. The "Incomplete" must be made up before the lapse o
endar year. An "Incomplete" which is not removed within one cale
remains as a grade of *I* on the student's record. The grade of *I* c
removed by reregistering for the course here, or by taking its equiva
where.

The grade of *I* is also given for all thesis and dissertation researc
until the thesis or dissertation is completed. Upon the satisfactory co
of the thesis or dissertation the grade *I* is changed to *CR* automatic
grade of *CR* is given for an *Advanced Reading and Research* (usua
bered 398) course.

Scholarship Requirements

Graduate students are expected to maintain a minimum accumulativ
average of *B* (3.00) in all course work in the program of studies. In
departments may require a higher average. The fields of art history,
history, and psychology require a 3.25 average.

In the case of a student who receives a grade of *F* for a course in t
gram of studies, the Graduate School will require a written statement fr
department justifying the student's continuance in the Graduate Scho
outlining the program to be followed. Continuation is contingent up
Dean's approval. A course in the program of studies for which an *F*
ceived cannot be subsequently removed from the program even thou
other course is taken as a substitute.

A student may repeat for credit a course in which a grade of *C* or
was received *only when permitted to do so by the department conc*
unless the course description states that the course may be repeated for
A written statement to this effect must be submitted for approval to the D
Office by the appropriate departmental adviser. It is then filed wit
Registrar.

A graduate student may take an advanced undergraduate course (o
numbered 101-200) for graduate credit only upon the approval of the
and the department at the time of registration. Such approval is granted
with the provision that students complete additional work in order to re
graduate credit.

Program of Studies

The program of studies must be approved by the departmental adviser and
in the Graduate School Office no later than November 1 for graduate stu
entering in the fall semester, or March 15 for graduate students entering
spring semester. A program of studies may be revised, when necessary, b
taining the approval of the departmental adviser and the Dean. The revi
must be filed in the Graduate School Office.

Continuous Registration

All students must maintain continuous registration while working toward a
gree, except during the summer session. If continuous registration is not m
tained, the student is dropped from the degree program unless leave of abs
is granted by the Graduate School.

of Absence

dent is temporarily unable to continue the program of studies, the student quest leave of absence for a specific period of time, not to exceed one cal- year. An exception is made for students granted military leave. A stu- ho is called to active duty may be granted military leave (see page 49) duration of the period of military duty upon presentation to the Grad- chool of a copy of the military orders and a request for such leave. When riod of leave has expired, it is the student's responsibility to notify the ate School at least two months in advance of a given registration period intention to reregister. If a student fails to reregister, the candidacy is ated.

rawal

uate students who intend to withdraw from the Graduate School should m the School in writing. The last day for *complete* withdrawal without mic penalty is at the end of the eighth week of classes.

uation Requirements

udents must file an "Application for Graduation" form and pay the re- d graduation fee at the time of registration for the last semester or sum- session of the final year in which they intend to graduate. The student must gistered in the Graduate School during the semester he plans to graduate. er's and doctoral candidates may graduate in May, February, or Septem- A student who has completed the requirements for a degree but has not een awarded the degree will be issued a letter to this effect upon request.

REES

d below are the degree programs of the Graduate School of Arts and Sci- and the specific degrees offered, by field. The programs are directed by departments concerned. Degree programs which bridge two or more de- ments are directed by committees composed of members of the depart- ts concerned. For further information write to the Dean or the chairman e appropriate department.

he degrees of Master of Arts in Special Studies and Master of Science in ial Studies are designed for students who do not wish to concentrate in a ific field such as those listed below, but instead are interested in inter- plinary programs. It is possible to group several of these fields together ake an interdisciplinary program; the program of studies is determined by student in consultation with the Special Studies Program Steering Com- e. The student may choose courses from those fields pertinent to the nt's academic goal; however, a student cannot have more than one-third e courses from any one department. The student must obtain permission to the courses from the appropriate departments.

e Graduate School of Arts and Sciences offers programs of study on us leading to the degree of Master of Arts in Special Studies with con- ations in Ethnographic Conservation (see pages 225–26, 234), Criminal e (see page 324), Women's Studies (see page 510), and Philosophy and l Policy (see pages 415). The School also offers Master of Arts and Master

of Science in Special Studies degrees in specific academic areas at
locations (see page 106).

Graduate Fields

The graduate course work offered in support of the degree progr
following list is shown by department in this catalogue.

Subject	Degr
I. Humanities	
American Civilization	
American Literature	M
Art:	M
Ceramics	M.F
Design	
Graphics	
Painting	
Photography	
Sculpture	
Art History	
Classical Archaeology, Classics and History	M.
Dramatic Art	M.
English Literature	M.F.
*French Literature	M.
Germanic Languages and Literatures	M.
History of Religions—Hinduism	M.
Music:	M.
Applied Music	Mus.M
Composition	
Conducting	
Music Theory	
Musicology	
Philosophy	M.A.
Religion	M.A.
Religion and Medical Care	M.A.
Religious Education	M.A.
Russian Language and Literature	M.A.
*Spanish American Literature	M.A.
*Spanish Literature	M.A.
	M.A.
II. Social Sciences	
Anthropology	
Economics	M.A.
Education Policy	M.A.
Geography	
History	M.A.
†International Relations	M.A.
Political Science	
Sociology	M.A.
	M.A.

* Any approved combination of French, Spanish, or Spanish American Literature is avail
Doctor of Philosophy field.
† The School of Public and International Affairs offers a Master of Arts field in International

Physical and Mathematical Sciences

Applied Mathematics	M.A., M.S.
Applied Statistics	M.S.

Subject	Degrees Offered	
Chemistry	M.S.	Ph.D.
Engineering Geology	M.S.	
Forensic Sciences	M.F.S., M.S.F.S.	
Geochemistry	M.S.	Ph.D.
Geology	M.A., M.S.	Ph.D.
Mathematical Statistics	M.A.	Ph.D.
Mathematics	M.S. for Teachers, M.A.	Ph.D.
Physics	M.A.	Ph.D.

Biomedical and Related Sciences

Anatomic Pathology	M.S.	
Anatomy		Ph.D
Art Therapy	M.A.	
Biochemistry	M.S.	Ph.D.
Biological Sciences	M.S.	Ph.D.
Genetics	M.S.	Ph.D.
Microbiology	M.S.	Ph.D.
Mycology	M.S.	
Pathology		Ph.D.
Pharmacology	M.S.	Ph.D.
Physiology	M.S.	Ph.D.
Psychology	M.A.	Ph.D.
Speech Pathology and Audiology	M.A.	

Combined Master of Science and Doctor of Medicine Degrees

Students interested in the combined degrees of Master of Science and Doctor of Medicine must meet the requirements for admission to the Graduate School of Arts and Sciences and to the Doctor of Medicine degree program of the School of Medicine and Health Services.

The Master of Science program consists of a minimum of 30 semester hours of credit and the fulfilling of the tool requirement (see pages 101–2). A maximum of 12 semester hours of credit for graduate-level courses *completed as a part of the Doctor of Medicine degree curriculum* (and not already applied toward the bachelor's degree) will be allowed in fulfillment of the requirements for the Master of Science degree. The remaining 18 semester hours of work, which in most programs includes a thesis, must be work in the basic medical sciences normally required for a Master of Science degree in the Graduate School of Arts and Sciences.

Dual Program for the Doctor of Medicine and Doctor of Philosophy Degrees

A dual program is available to qualified students who seek both the Doctor of Medicine and Doctor of Philosophy degrees. The requirements which must be fulfilled for both degrees are identical to those currently and separately estab-

[1] Biology, botany and zoology.

lished in the School of Medicine and Health Sciences and the Gradu
of Arts and Sciences.

A student working toward these degrees may apply a maxim
semester hours of approved course work in the School of Medicine
Sciences toward the minimum of 48 hours of course work required
for the General or Cumulative Examination for doctoral candid
course work is normally taken during the semesters that alternat
medical program and in the years following the award of his M.
The student's research for the dissertation may begin concurrently wit
24 semester hours of graduate course work leading to the General
lative Examination. The estimated time for the completion of this dua
is six years.

In order to enter the dual degree program, a prospective student
apply for and gain admission to both the Graduate School of Arts an
and the School of Medicine and Health Sciences separately through e
procedures. Upon admission to both schools, the student may then
affiliation with the dual degree program. Work toward the Doctor of P
degree is performed under the jurisdiction of a *departmental* Docto
mittee.

REQUIREMENTS FOR THE D

The Master's Programs

Unless otherwise specified, the requirements listed below are applicabl
didates for the degrees of Master of Arts, Master of Arts in Special
Master of Fine Arts, Master of Forensic Sciences, Master of Music, M
Science, Master of Science for Teachers, Master of Science in Forensic
and Master of Science in Special Studies.

1. *General Requirements.*—For a master's degree program *incl*
thesis, the satisfactory completion of a minimum of 30 semester hour
proved graduate work, including 6 semester hours of thesis research, is
For a master's degree program which does *not* include a thesis, the nu
semester hours of approved graduate course work is determined by the
ment, and normally consists of from 30 to 36 semester hours. The
without the thesis is not an individual student option and is not avai
every department. Departments can and often do set requirements ab
minimum required by the Graduate School. The program of study leadin
degree of Master of Arts in Special Studies or Master of Science in
Studies consists of 36 semester hours of approved graduate course w
does not require a thesis.

Work taken to make up deficiencies is never counted as part of the
ments leading to a master's degree. Upon approval, up to one-half of
quired graduate work may be taken in courses offered by the other
institutions of the Consortium of Universities of the Washington Metr
Area, Inc., or by another degree-granting division of this University. I
is transferred from another institution (see "Transfer of Credit," page
the number of semester hours which may be taken at an affiliated Con
institution is reduced by the number of hours accepted as transfer cre

ull-time master's degree candidate must complete degree requirements three years and a part-time master's candidate must complete degree ements within four years. Extensions beyond these time periods require val of a written request based on specific and temporary interfering nstances.

Academic Work Load.—Full-time students register for 9 to 12 semester each semester; part-time students register for 6 semester hours each se- r. These requirements do not apply when a student has fewer than 9 ter hours (full-time) or 6 semester hours (part-time) remaining to com- his program. No more than 15 semester hours may be taken during any emester.

Transfer of Credit.—A maximum of one-quarter of the semester hours aduate course work required for a degree may be approved for transfer to raduate School from the Division of University Students, another degree- ing division of this University, or another accredited college or university. transfer of credit to be approved *all* of the following conditions must be the course work must have been taken prior to admission to the Graduate ol, it must be approved as part of the student's program of studies, it not have been applied to the completion of requirements for another ee, it must be post-baccalaureate graduate-level course work, it must have taken within the past two years, and the student must have received a e of *B* or better in each course for which a transfer of credit is requested. action must be made in writing and approved by the departmental adviser the Dean. A transcript of the course work must be on file before the est can be considered.

Tool Requirement.—Except for candidates for the degrees of Master of in the field of Art Therapy, Master of Arts in Special Studies, Master of in the field of Speech Pathology and Audiology (nonthesis option), Master orensic Sciences, Master of Music, Master of Science in Anatomic Path- gy, Master of Science in Forensic Sciences, and Master of Science in Special dies; candidates for Master's degrees in the Department of Mathematics; and didates in the field of Dramatic Art for the degree of Master of Fine Arts, ster's candidates normally must complete successfully a tool requirement in oreign language, mathematics, statistics, or computer programming. In ce of a tool requirement, candidates for the degree of Master of Fine Arts he fields of ceramics, design, graphics, painting, photography, or sculp- e will complete a methods course selected by the Department of Art. he tool requirement examination should be passed prior to the beginning the third semester of graduate work: students who have not fulfilled this uirement must register for the appropriate course at the beginning of the d semester. Courses taken to satisfy the tool requirement cannot be counted the semester-hour requirement for the master's degree. No master's candi- e may attempt a tool examination more than three times. A tool requirement filled at another university cannot be used to fulfill the requirement at this iversity.

With the approval of the department directing the student's program of study, tool requirement may be selected from the following options:

(a) Passing a foreign language reading examination (a student may register the appropriate reading course for nonmajors or make arrangements with appropriate department to take the examination on the scheduled dates). A

student majoring in a foreign language may not select that language
this requirement; a student whose native language is not English
English as the tool (students choosing English should contact the
Department).

(b) Completing with a grade of *B* or better a course in mathema
tistics, or computer programming which is approved by the approp
partment and by the Graduate School; or passing a special examinat
ering the approved course material, administered by the appropriate
ment, at the level of the final examination.

5. *The Thesis.*—The main purpose of a master's thesis is to dem
the student's ability to make independent use of the information and
acquired through other disciplines and to furnish objective evidence
structive powers in a chosen field. The student registers for 6
hours of thesis research and must complete the thesis no later than thre
dar years after the initial registration. The student must maintain con
registration during the period required to complete the thesis. Registra
thesis research entitles the student to the advice and direction of the mem
the faculty under whom the thesis is to be written. The thesis subject
approved by the professor who will be directing the thesis. The thesis
final form with one copy and a certificate of approval signed by the
director and at least one departmental reader, must be presented to th
no later than the date announced in the University Calendar. All these
meet the form, style, and other requirements set forth in a pamphlet, *In*
tion Concerning Theses and Dissertations, available in the Office of the

6. *Master's Comprehensive Examination.*—Most master's degree can
must pass a Master's Comprehensive Examination in the major subje
aminations are held on dates fixed by the departments, so that results
filed in the Graduate School Office no later than the day before the
meets to approve the list of graduates.

A student who fails to pass the Master's Comprehensive Examinatio
in exceptional circumstances, and with the approval of the department a
Dean, repeat the Examination at the next scheduled Examination date.
student fails a second time, no further opportunity to take the Examina
permitted.

The Doctor of Philosophy Program

The minimum requirements for the doctoral program are as follows:

1. *General Requirements.*— The program leading to the degree of Doc
Philosophy requires the satisfactory completion of a minimum of 72 se
hours of approved graduate work for entering students whose highest
degree is a baccalaureate. A minimum of 48 of these hours must be tak
preparation for the General Examination. Entering students whose h
earned degree is a master's degree are required to register for a minimum
semester hours of approved graduate work, no fewer than 24 of which m
taken in preparation for the General Examination. While completing th
sertation portion of the program, the student must register for 12 to 24 se
hours of *Dissertation Research*, depending on the number of hours comp
prior to the General Examination. The exact number of semester hou
quired for any part of the total program is assigned by each departmen
may exceed the minimum required by the Graduate School.

Academic Work Load.—Full-time students register for 9 to 12 semester each semester; part-time students register for 6 semester hours each ster. These requirements do not apply when a student has fewer than 9 ster hours (full-time) or 6 semester hours (part-time) remaining to com- his program.

Transfer of Credit.—Entering students who do not hold a Master's de- may request transfer of up to 24 semester hours of credit toward a doc- degree for acceptable post-baccalaureate graduate work taken at the er's degree level at George Washington University or another accredited ge or university.

Tool Requirements.—As early as possible, and *before* completion of the eral Examination, the tool requirements specified in the program of study be completed. The following rules apply to students permitted to elect or (c) below: students entering the Graduate School with a bachelor's ee must satisfy the first tool requirement before completion of 15 semester s of course work; students entering with a master's degree must satisfy the tool requirement no later than the second semester of registration as a tor of Philosophy student. Courses taken to fulfill the tool requirement not counted in the semester-hour requirement for the Doctor of Philosophy ee program. The tool options are as follows:

a) two foreign language reading examinations;

b) high-level proficiency in one foreign language;

c) one foreign language reading examination and the completion with a e of *B* or better of a course in mathematics, statistics, or computer pro- nming which is approved by the appropriate department and by the duate School. It is possible to satisfy the latter part of the requirement by ing a special examination covering the approved course material, adminis- by the appropriate department, at the level of the final examination.

doctoral student whose native language is not English may not elect the e language to meet a foreign language examination requirement. With the oval of the student's department, English may be elected to fulfill the lan- e requirement in any of the options listed above except (b). The student is given approval to take a language examination in English should make ngements with the Department of English.

doctoral student may omit a tool preparation course at George Washing- niversity if the student has had a similar course at another college or uni- ty. However, proficiency in that tool must be validated by an examination is University.

rther details for meeting the various tool requirements are stated in the duate School's Student Handbook.

The General Examination.—Each student is required to complete the eral Examination no later than the semester following the completion of e requirements. The General Examination is composed of a written ex- ation 5 to 6 hours in length in each of the areas of study comprising the nt's total program; the time permitted between each examination is deter- d by the administering department. Some departments permit one or two of study to be "written off"; that is, a special, shorter examination is after a year of course work in the area. A cumulative examination sys- is in effect in the fields of chemistry and physiology, and in the field of ology a system of two comprehensive examinations is used. Students in

these fields should consult the appropriate department for informa
its system.

6. *The Degree of Master of Philosophy.*— Upon departmental rec
tion, the degree of Master of Philosophy may be awarded to students
successfully completed all requirements for the Doctor of Philoso
up to and including the General Examination. Not all departments r
students for this degree.

7. *The Dissertation and Final Examination.*—A dissertation is r
each doctoral candidate as evidence of ability to perform scholarl
and interpret its results. The candidate normally enrolls for *Dissertatio*
upon completion of the General Examination; however, the candidate
ister for up to one-half of the required number of semester hours o
tion Research during the time the General Examination is being c
After the required number of hours of *Dissertation Research* has bee
more time is needed to complete the dissertation, the student must mai
tinuous registration (see page 49) each semester until the dissertat
ished and the Final Examination is passed. If the dissertation is not c
within five years from the date the General Examination is completed
dent will be required to retake the General Examination.

No later than the date specified in the University Calendar, the
must submit to the Dean the original and one copy of the dissertatio
abstract for inclusion in the Announcement of the Final Examinatio
reproduction by University Microfilms, Inc.

When the dissertation has been approved by the Director and two
of the Doctoral Program Committee and filed with the Dean, the c
takes the Final Examination, an oral examination which is open to th
A committee of examiners (composed of Graduate School Faculty a
appropriate, outside scholars) conducts the Examination. If the c
passes, he or she is recommended by the Graduate School for the d
Doctor of Philosophy.

Detailed information regarding regulations for the form and reprod
the dissertation is available in the Office of the Dean. The successful c
for the doctorate is required, before receiving the degree, to pay a fee
the expense of printing the Announcement of the Final Examination.
the basic service rendered by University Microfilms, Inc.

POSTDOCTORAL S

George Washington University doctoral graduates may continue any st
the University without payment of tuition, and enjoy all University
privileges. Such graduates are required to pay the usual "continuous r
tion" fee and the University Center fee in order to establish their activ
bership in the University. The use of laboratory space and equipment
tingent upon availability, and the cost of all laboratory or special libra
terial is paid by the graduate. Special arrangements for such privileges m
made with the Dean two months in advance of the semester in wh
graduate wishes to register. Postdoctoral work taken under this privile
not be applied toward any degree offered by the University.

FELLOWSHIPS AND FINANCIAL AID

mited number of graduate teaching fellowships are available in most de-ments of instruction to students registered in the Graduate School of Arts Sciences. Other kinds of sponsored and University awards are available, imited.

udents applying for admission who also wish to apply for a fellowship ld submit the fellowship application and the application for admission by uary 15; the necessary transcripts, Graduate Record Examination scores, letters of recommendation should also be on file by this date. Students ently enrolled in the Graduate School should submit only the fellowship ication and have current letters of recommendation on file by February 15. orms are available at the Office of the Graduate School of Arts and Sci-s. Filing the fellowship application entitles the student to consideration for wards available in the student's department.

tudents who wish to apply for loans should indicate their intent to do so he application for admission. Information concerning loans is contained booklet, *Student Financial Aid*, available from the University's Student ncial Aid Office.

COOPERATIVE PROGRAMS

American Studies Program at George Washington University is affiliated the American Studies Program of the Smithsonian Institution. This ar-gement offers the student in the field of American Civilization an oppor-ity to take advantage of the Washington environment. Members of the staffs he Smithsonian's American Studies Program, Museum of History and Tech-ogy, National Portrait Gallery, National Gallery of Art, and National Gallery Fine Arts offer seminars and tutorial instruction in fields which provide the dent with an unusual opportunity to develop new dimensions in the discipline American Civilization. This program of study is open to students working ard the degrees of Master of Arts and Doctor of Philosophy, and is intended repare them for research, teaching, and museum-related careers.

The Department of Art at George Washington University and the Smithson-Institution offer a joint graduate program of study and research in museum dies leading to the degree of Master of Arts in the field of Art History with concentration in Museum Training. The Department has also established a gram of study in affiliation with the Textile Museum, the Corcoran Gallery Art, and area private art galleries. A program in ethnographic conservation resently under study in conjunction with the Department of Anthropology d Smithsonian Institution and may be available in the 1976-77 academic ar.

A program of study leading to the degree of Doctor of Philosophy in erican Civilization with emphasis on library research and collections is ered jointly by George Washington University and the Library of Congress. e coordinator of the Library Program and the staff offer an orientation minar and other courses and supervise students in reading and research d in work on such library problems as indexing, cataloguing, and bibliog-phy.

For further information concerning these programs contact one of th
ing offices at George Washington University: the Graduate School of
Sciences for those who are interested in any of the fields listed ab
Department of Art for those interested in museum training, the A
Studies Program for those interested in the American civilization field.

George Washington University, in cooperation with three other
universities and the Folger Shakespeare Library, has established the
Institute for Renaissance and 18th Century Studies as a cooperative
in graduate studies in the humanities. Seminars (limited to 12 student
are offered each semester under the direction of outstanding Americ
foreign scholars. The Folger Library is the physical center for the Instit
participants enrolled in the seminars are granted access to the collections
books, manuscripts, and reference materials of the Library. There are
portunities for participants to establish personal relationships with the
and readers at the Library, in the furtherance of their research. All re
students are eligible to apply for admission to one or more of the semi
though priority in enrollment will be accorded to graduate students wor
dissertations and to postdoctoral scholars from the sponsoring institutio

Further information, including a listing of seminar topics, is available
Office of the Graduate School of Arts and Sciences of George Wash
University or at the Folger Shakespeare Library.

The University and the National Bureau of Standards have entered
cooperative agreement to further educational opportunity at both the U
sity and the Bureau. This arrangement holds great promise for graduate
and research, particularly in the physical sciences.

SPECIAL OFF-CAMPUS DEGREE PROGRAMS

The Graduate School of Arts and Sciences is currently offering the foll
special degree programs off campus: (1) the degree of Master of Arts in S
Studies with areas of concentration in Criminal Justice, Legislative Affa
Urban Learning, and (2) the degree of Master of Science in Special S
with area of concentration in Telecommunication Operations, Environm
Studies, and Social and Economic Statistics.

The Graduate School has academic jurisdiction over these off-campus
grams which are administered by the College of General Studies. For
consult the Graduate School of Arts and Sciences.

HOOL OF EDUCATION

n R. Tillman
istant Dean R.E. Baker
cutive Assistant to the Dean L.H. Kornhauser

CULTY*

ofessors J.G. Allee, Jr., R.E. Baker, J.G. Boswell, P. Botwin, J.L. Breen, M. Brenner, W.T. Carroll, M.E. Coleman, R.S. Cottrell, Jr., L.H. Elliott, R.J. Frankie, R.G. Hanken, D. Hawkins (*Research*), R.K. Ives, E.M. Johnson, S. Kavruck (*Visiting*), A.D. Kirsch, A. Marinaccio, M. McIntyre, L. Nadler, M.N. Rashid, C.R. St. Cyr, D. Sinick, L.M. Stalling, R. Tillman, C.E. Vontress

sociate Professors S.L. Clark, A.L. Dickerson (*Research*), J.W. Fleck, L.H. George, G. Horrworth, E.P. Kulawiec, D. Linkowski, D.A. Moore, S.R. Paratore, R. Peterson, J.R. Shotel, G.W. Smith, J.E. Snodgrass, G.D. Wiggs, L. Winkler, M.R. Withers

djunct Associate Professors D.C. Paup, P.J. Verhoven

ssistant Professors M.S. Castleberry, J.A. Greenberg, J.C. Heddesheimer, N.D. Johnson, J.A. Kuhagen (*Research*), S.J. Little, H. Nashman, R.W. Prouty, C. Reeder (*Research*), B.W. Sabelli, L.A. Tsantis

structors M. Gazvoda, S.A.R. Hoth (*Research*), J.S. Landy, J.L. McCauley, D.C. Park (*Research*), N.J.S. Sobel

EMBERS OF THE ADVANCED GRADUATE FACULTY

.E. Baker, J.B. Boswell, P. Botwin, J.L. Breen, M. Brenner, W.T. Carroll, .S. Castleberry, S.L. Clark, R.S. Cottrell, Jr., L.H. Elliott, R.F. Frankie, . Hawkins, J.C. Heddesheimer, G. Horrworth, R.K. Ives, V.R. Kirkbride, .D. Kirsch, E.R. Kulawiec, D. Linkowski, A. Marinaccio, D.A. Moore, . Nadler, S.R. Paratore, R. Peterson, M.N. Rashid, C.R. St. Cyr, J.R. Shotel, . Sinick, G.W. Smith, J.E. Snodgrass, L.M. Stallings, R. Tillman, L.A. Tsantis, C.E. Vontress, G.D. Wiggs, L. Winkler

COMMITTEES†

THE DEAN'S COUNCIL‡

1975: D. Hawkins, C.E. Vontress

* The President of the University, the Vice President for Academic Affairs, the Registrar of the University, the Director of Admissions of the University, and the University Librarian are ex officio members of the Faculty of the School of Education.
† The Dean and the Assistant Dean of the School of Education are ex officio members of all committees.
‡ Elected by the Faculty in the year designated to a three-year term.

1976: R.K. Ives, J.C. Heddesheimer
1977: D.A. Moore, J.R. Shotel

COMMITTEE ON ADMISSION AND ADVANCED STANDING*

R. Tillman (*Chairman*), P. Botwin, J.L. Breen, D. Linkowski, J.Y. Ruth

COMMITTEE ON SCHOLARSHIP

R. Tillman (*Chairman*), P. Botwin, J.L. Breen, D. Linkowski

INTRODUC

It is the purpose of the School of Education to prepare teachers, coun and administrators for leadership responsibilities, and to offer experi teachers opportunities to extend their education. The School includes th partments of Education, Human Kinetics and Leisure Studies (*formerly cal Education*), and Special Education. It offers both graduate and u graduate work. Other departments of the University provide general edu and subject-matter courses needed for a well-balanced program of teache cation.

Individually planned programs are provided for liberal arts and oth lected graduates who wish to prepare for teaching. The School also pr a wide range of courses to provisional teachers who wish to qualify for ing certificates and teachers who wish to renew licenses. Degree progra adult education, college student development, generic counseling, higher tion, human resource development, rehabilitation counseling, therapeutic r tion, tourism, and urban recreation and parks are offered.

Laboratory and clinical facilities are provided by the University Re Center and Speech and Hearing Clinic. In cooperation with public and p schools and a wide variety of social agencies, ample opportunity for fie perience is provided.

In addition to a full schedule of weekday courses during the academi classes are offered in the evening, on Saturday, and during the summer.

Historical Development

The University began offering professional courses for teachers in 1904- in 1907 it established a Division of Education. In 1909, the Division o cation became the Teachers College, which in its early years was con largely with the teacher preparation on the undergraduate level. In 192 Teachers College became the School of Education, and greater provisio made for advanced study. Graduate enrollment has steadily increased, and the School has a considerably larger number of graduate than undergr students.

EDUCATION FOR TEAC

Programs are planned to provide a broad general education, adequate m of the teaching-field content, and professional competence. The relativ

* Appointed by the Dean.

s placed on each of these depends on the student's teaching-level plan. example, elementary school teachers, since they teach all subjects, need aration of greater breadth and less specialization than secondary school ers.

dequate preparation for teaching requires an acceptable minimum of four s of full-time study. Five years terminating in a Master of Arts in Educa- degree are needed for superior preparation which will command higher ies and opportunities for promotion. During the first two years, the student gistered in Columbian College of Arts and Sciences, the liberal arts college he University, where the background of general education so essential to ess as a teacher is acquired. Here the student is assigned a special adviser n the School of Education to assist in planning a program.

GULATIONS

ulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *are ed on pages 21–34; other University regulations, on pages 45–52.*

demic Work Load

teen to 17 semester hours of credit constitute a normal program. A student h a quality-point index of 3.00 or higher may, with the permission of the an, enroll for 18 or 19 hours. No student may enroll for more than 19, ept by permission of the Committee on Scholarship.

A student employed 15 hours or less a week may carry a normal program college work.

A student employed from 16 to 25 hours a week may enroll for 12 or 13 urs. With a quality-point index of 3.00 or higher a student may, with special rmission of the Dean,* enroll for 14 to 16 hours.

A student employed from 26 to 34 hours a week may enroll for 9 or 10 urs. With a quality-point index of 3.00 or higher a student may, with special rmission of the Dean,* enroll for 11 to 13 hours.

A student employed 35 hours or more a week may enroll for 6 or 7 hours. ith a quality-point index of 3.00 or higher, a student may, with special per- ission of the Dean,* enroll for 9 or 10 hours.

A student who increases the hours of employment after registration or at any ne during a semester must report immediately to the Dean so that the student's ogram may be adjusted, if necessary.

RADUATE

tudents employed full-time may take a maximum of 6 semester hours, unless pecial permission to take more is granted by the Dean.*

arning Credit by Examination

Undergraduate and graduate students may earn semester-hour credits up a maximum of 30 hours by performing satisfactorily on College-Level Ex- mination Program Tests (CLEP) or special departmental examinations—pro-

* Request forms are available at the Office of the Dean. They should be filled out and returned to e Dean at least two weeks prior to registration.

vided by the departments of Columbian College of Arts and Sciences individual basis. *Passing a waiver examination does not entitle the stud any semester hours of credit.*

College-Level Examination Program (CLEP).—CLEP offers two ty examinations:

1. CLEP Subject Examinations are offered in 20 subject areas. Thes measure achievement in the equivalent of specific college-level courses. may be assigned for any CLEP Subject Examinations passed at the level mended in the College Board model policy. (Credit may not be ear passing the examination after having taken the equivalent course.)

2. CLEP General Examinations are offered in five areas; mathematics sciences, humanities, the natural sciences, and English composition. (C advanced standing—is not given for the General Test in English Compo

Credit will be noted on official transcripts of the George Wash University for students who achieve scores above the 50th percent CLEP General Examinations with the exception of the English Comp Examination. Further information can be found on pages 23–24 and CLEP Registration Guide which may be obtained from the Educational Service, One Dupont Circle, N.W., Washington, D.C. 20036.

Students interested in becoming certified to teach who have earned lor's or graduate degrees in fields other than education may satisfy som tification requirements by taking CLEP or Special Subject Examinations.

See page 80 for additional information on special examinations offe departments.

The Bachelor's De

THE SCHOOL OF EDUCATION OFFERS UNDERGRADUATE PROGRAMS leading degrees of Bachelor of Arts in Education and Bachelor of Science in Kinetics and Leisure Studies.

The program of each student must be approved by a faculty adviser each student's program is defined by individual needs, it is important student have a clear concept of his or her major interest in education, that the student be familiar with the teaching-certificate requirements locality in which he or she expects to teach.

ENTRANCE REQUIREMENTS

Bachelor of Arts in Education and *Bachelor of Science in Human and Leisure Studies.*—The satisfactory completion of the appropriate fi year curriculum in Columbian College of Arts and Sciences (see pages or the equivalent from another accredited educational institution with a point index of at least 2.25 or the equivalent, is required. Applicants an application for formal admission to the School of Education. This fo be obtained from the Office of the Dean, the School of Education Washington University, Washington, D.C. 20052. In addition to filing a cation, out-of-state applicants must provide the School of Education with one letter of reference from instructors who know them. Candidates in

ion curriculum in Columbian College and residents in the Washington, metropolitan area must arrange for an interview by calling the Office of ean, in addition to filing the application. At the admissions interview, ap- ts must exhibit personality traits that give promise of success as a teacher. ducation majors in Columbian College, who may be admitted tentatively completing 45 semester hours or fully after completing 60 hours, must e recommended by their pre-education adviser.
addition to the regular admissions interview, an interview with the Special ation program adviser is required of applicants interested in Special Edu- .

UIREMENTS FOR THE DEGREES

e recommended for a degree a student must satisfy the admission, resi- e, scholarship, and curriculum requirements.

DENCE

lidates for the bachelor's degree must complete satisfactorily while in the ol of Education a minimum of 30 semester hours.
or full details concerning continuous registration, see page 49.

N'S LIST

be eligible for the Dean's List a full-time student must obtain a quality-point x of 3.5 on courses completed during the past semester. A part-time stu- , to be eligible, must obtain a quality-point index of 3.5 on the last 12 ester hours of coursework. Such part-time students must have been enrolled at least one three-hour course each semester, and residence during the od involved must be continuous.

OLARSHIP REQUIREMENTS

the system of grading and of computing scholarship, see pages 45–47.
n order to graduate, a student must have a quality-point index of at least 5.

robation.— A student who fails to maintain a quality-point index of at least 5 is placed on probation. The student remains on probation as long as the ex is below 2.25, or until probation is removed by the Committee on Scho- hip.

uspension.—A student on probation who fails to raise the index to 2.25 hin the time specified may be suspended.
A student suspended for poor scholarship may, within 10 days, appeal the e to the Committee on Scholarship through the Dean. If the case appears be remediable and the student's scholarship seems likely to improve, the mmittee may readmit the student on probation. A student denied readmis- n may again, after a lapse of a calendar year, petition the Committee through Dean for readmission. A student suspended twice will not be readmitted.

CURRICULUM REQUIREMENTS

In all bachelor's curricula at least 30 semester hours must consist of numbered above 100.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Condition under which the grades of *I* (Incomplete) or *W* (Authorized drawal) may be assigned are described on page 46.

Removing an Incomplete.—Although the grade of *I may* remain records for a maximum of one year, the instructor should normally set briefer period within which the uncompleted work (usually the final exam or a required paper) must be made up. The grade of *I* cannot be remo reregistering for the course here, or by taking its equivalent elsewhere. complete" cannot be made up after the lapse of one calendar year exc written permission of the Dean's Council. An "Incomplete" which is moved within one calendar year is automatically changed to an *F*.

CREDIT/NO CREDIT OPTION

A junior or senior student who has a cumulative quality-point index or better, may, with the approval of an adviser and the Dean, take one c semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which recorded on the student's transcript but will not be reflected in the st quality-point index. No student will be allowed to take more than four cre credit courses. A student must sign up for such an option at registration. no circumstances may a student change from credit/no credit status to status, or vice versa, after the end of registration. Courses required student's major field may not be taken on the credit/no credit basis. A fer student may not choose this option until the second semester of enr at this University.

BACHELOR OF ARTS IN EDUCATION

The objective of programs leading to the degree of Bachelor of Arts in tion is to provide (1) general educational backgrounds; (2) functiona mand of ideas, concepts, knowledge, and skills in one or more teaching (3) mastery of basic professional information and skills adequate for the ning teacher; and (4) development of attitudes needed for success in te

The general educational backgrounds needed by prospective teachers tained through precollege education, college courses, work experience, ship activities, student campus activities, and off-campus cultural opportu

Normally, from 63 to 66 semester hours of the total requirement are pleted in Columbian College of Arts and Sciences of this University or equivalent institution elsewhere (see "Education Curriculum," pages 81- Since the teaching fields differ in content, scope, and complexity, some pr are longer than others.

Work experience, leadership activities, participation in student campus ties, and *the utilization of off-campus cultural opportunities.*—As part of course work and on their own initiative, students of the School of Educ are expected to take full advantage of the many opportunities in the Wa

a for developing leadership skills. Advisers are available to help students ese experiences.

al Teacher Examinations

ndidates for the degree of Bachelor of Arts in Education are required to he National Teacher Examinations. Students receive individual reports scores and may avail themselves of the regular transcript services of ducational Testing Service. Students must request the Testing Service to opies of test scores to the School of Education.

dents required to take the Examinations must register for them with the tional Testing Service. Application forms are available in the Office of an.

ing-Field Programs

CT-AREA SPECIALIZATION

t-area specialization depends upon the teaching position for which the t is preparing. Those planning to teach in elementary schools need a e of competency in several fields. Those preparing to teach in middle ls must acquire competency in a chosen interdisciplinary subject-matter lization. Those preparing to teach in junior or senior high schools must nstrate competency in a major teaching field. A minor teaching field ional, but recommended. The student should begin teaching-field prepara- during the first two years in Columbian College.

aching-field requirements, developed in cooperation with appropriate de- ents of the University, include satisfactory completion of prescribed mic courses in one or more fields, a satisfactory score on the special field ination of the National Teacher Examinations* and satisfactory comple- of the prescribed special methods courses.

escribed academic courses vary in number in accordance with the scope complexity of the teaching field and the license requirements of the various .

me course requirements among the subject-area specializations in the ele- ary, middle school and secondary education programs overlap with course rements among the General Education requirements. Such courses need be taken once.

essional Education

basic professional information, skills, and attitudes needed by beginning hers are provided through a sequence of courses to be taken in the junior senior years. Lectures and class discussions are closely coordinated with

al field examinations of the National Teacher Examinations are available in elementary educa- early childhood education; biology and general science; English language and literature; industrial mathematics, chemistry, physics, and general science; social studies; physical education; business tion, music education; home economics; and art education.
dents preparing to teach history or geography take the special field examination in social studies. dents preparing to teach in fields in which special field examinations are not available must a satisfactory score on a special field examination given by the instructor in the special methods involved.

field work. Instruction is differentiated to meet the needs of those prepa teach on the various levels—elementary school, middle school, junio school, senior high school and adult.

The prescribed courses in special methods are concerned primaril methods of initiating, guiding, and evaluating learning experiences deali the content of teaching fields. They attempt to bring to the student suggestions drawn from the accumulated experience of successful te However, in addition, the courses review the teaching-field content cu in use in schools, and examinations at the end of courses provide the fi of competency in the teaching fields.

The teaching-field programs and their requirements are as follows:

ELEMENTARY EDUCATION PROGRAM*

General Education Requirements

(See pages 81–82)

SUBJECT-AREA SPECIALIZATION

Art:	Survey course to be selected by the student
Econ 1:	Principles of Economics
Geog 51:	Introduction to Geography, or
Geog 52:	Introduction to Economic Geography
Hist 71–72:	Introduction to American History
Math 9, 10:	General Mathematics I, II
Music:	Survey course to be selected by the student
HKLS:	As approved by the adviser
†Science:	As approved by the adviser
Social Studies:	As approved by the adviser
	Total

PROFESSIONAL COURSES

Educ 108:	Human Development, Learning, and Teaching
Educ 110:	Elementary School Teaching of Reading
Educ 111:	Elementary School Curriculum and Methods
Educ 112:	Educational Measurement
Educ 123:	Society and the School
Educ 135:	Student Teaching in Elementary Schools
	Total

Students majoring in Elementary Education may prepare for an addi area of certification by substituting for elective courses a special sequen courses in Early Childhood Education or Special Education.

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* Students majoring in Elementary Education may prepare for an additional area of certifi substituting a special sequence of courses in Early Childhood Education or Special Educa elective courses.

† The science requirement must include courses in both physical and biological sciences.

AREA OF CERTIFICATION IN EARLY CHILDHOOD EDUCATION*

		Semester Hours
Educ 132:	Student Teaching in Early Childhood Schools	6
Educ 150:	Foundations of Early Childhood Education	3
Educ 152:	Early Childhood Curriculum	3
Educ 153:	Role of the Professional in Early Childhood Education	3
Educ 154:	Community Resources and Materials for the Young Child	3
	Total	18

AREA OF CERTIFICATION IN SPECIAL EDUCATION*

SpEd 101:	Seminar: Dimensions of the Complementary Teaching Role	3
SpEd 102:	Teaching the Child with Special Needs: Methods and Materials	3
SpEd 103:	Teaching the Child with Special Needs: Creative Programming	3
SpEd 170:	Interpersonal/Intrapersonal Relationships for Special Education Teachers	3
SpEd 189:	Preprofessional Practicum: Observing the Special Child in the Regular Class Milieu	3
SpEd 190:	Preprofessional Practicum: Inspecting a Continuum of Special Education Services	3
SpEd 199:	Practicum in Complementary Teaching	6
	Total	24

DLE SCHOOL EDUCATION PROGRAM

middle school education program offers four teaching-field specializations ner with appropriate professional training. While the importance of a ugh understanding of the nature of the middle school learner and the le school is emphasized, equal stress is placed on early and continued t experiences in the middle school. This experience culminates in a senior- block instructional program conducted largely in the field.

eral Education Requirements

pages 81–82)

ect-Area Specializations

COMMUNICATIONS

Anth 154:	Mythology and Folklore	3
Anth 158:	Art and Culture	3
Anth 161:	Language and Culture	3
Engl 10:	English Composition: Language as Communication	3

demic advising is required prior to the fall semester of the junior year.

Engl 11:	English Composition: Language and the Arts and Sciences or
Engl 12:	English Composition: Language in Literature
Engl 101:	Expository Writing
Engl 115:	Introduction to English Linguistics
Engl 161–62:	Studies in American Literature
Engl 191–92:	Introduction to European Literature
Jour 71–72:	Introduction to Mass Communication
Mus 3:	Introduction to Musical Understanding
Psyc 115:	Psychology of Language and Communication
SPDR 1:	Communicative Speaking and Listening or
SPDR 11:	Voice and Diction
SPDR 121:	Group Discussion and Conference Leadership
SPDR 135 or 136:	Radio Workshop
SPDR 169:	Introduction to Creative Dramatics
	Total

LIFE SCIENCE

BiSc 11–12:	Introductory Biology for Science Majors
BiSc 127:	Genetics
BiSc 140:	General Ecology
BiSc 141:	Plant Ecology or
BiSc 143:	Animal Ecology or
BiSc 144:	Aquatic Ecology
Chem 11–12:	General Chemistry
Chem 50:	Introduction to Organic Chemistry
Math:	Electives to be selected with approval of adviser
Phys 1:	Foundations of Physics or
Phys 2:	Introduction to Modern Physics
	Total

EARTH/SPACE SCIENCE

BiSc 140:	General Ecology
Chem 11-12:	General Chemistry
Chem 22:	Introductory Quantitative Analysis
Geol 1-2:	Introductory Geology for Nonscience Majors
Geol:	Electives to be selected with approval of adviser
Math:	Electives to be selected with approval of adviser
Phys 9-10:	Introduction to Astronomy
Phys 21:	Modern Cosmology
Phys 27:	Physics in Medicine
Other Courses:	To be selected with approval of adviser
	Total

SOCIAL SCIENCE

Anth 152:	Man, Culture and Environment
Econ 1–2:	Principles of Economics
Geog 51:	Introduction to Geography

		Semester Hours
Geog 52:	Introduction to Economic Geography	3
Hist 39–40:	European Civilization in Its World Context	6
Hist 71–72:	Introduction to American History	6
Hist 106:	History of Science and Technology	3
Sc 4 or 5, 6:	Introduction to Political Science	6
Soc 1:	Introductory Sociology	3
Soc 2:	Major Social Issues or	
Soc 129:	Race and Minority Groups	3
er Courses:	Second-group courses, as approved by the adviser, to be selected from anthropology, geography, history and sociology	9
	Total	51

PROFESSIONAL COURSES

Educ 108:	Human Development, Learning and Teaching	3
Educ 110:	Elementary School Teaching of Reading	3
Educ 112:	Educational Measurement	3
Educ 123:	Society and the School	3
Educ:	A second reading course and two middle school education courses to be announced	12
ial Methods:	Three semester hours to be selected from the following courses	3
Educ 136:	Teaching English in Secondary Schools	
Educ 137:	Teaching Speech	
Educ 138:	Teaching Social Studies in Secondary Schools	
Educ 144:	Teaching Science in Secondary Schools	
	Total	27

CONDARY EDUCATION PROGRAMS

he secondary education program a number of teaching-field specializations offered. However, it is strongly recommended that, wherever possible, a didate undertake a minor in an interdisciplinary subject area. Early nseling by the program adviser is urged to ensure a balanced and realistic gram of study. The requirements in the secondary education program are follows:

neral Education Requirements

ee pages 81–82)

bject Area Specializations

ART

ART HISTORY

Art 31–32:	Survey of Western Art, or	
Art 71–72:	Introduction to the Arts in America	6
Art:	Two second-group or third-group Art History courses if open to undergraduates	6

FINE ARTS

Art:	To be selected from the following
*Art 21–22:	Design I: Basic
Art 23–24:	Fundamentals of Photography
Art 41–42:	Drawing I
Art 51–52:	Ceramics I
Art 57–58:	Graphics I
Art 65–66:	Painting I
Art 81–82:	Sculpture I
Art 123–24:	Design II: Individual Problems
Art 125–26:	Painting II
Art 127–28:	Painting III
Art 131–32:	Ceramics II
Art 137:	Workshop in Materials, Methods, and Techniques
Art 143–44:	Serigraphy
Art 151–52:	Ceramics III
Art 153–54:	Graphics II
Art 157–58:	Graphics III
Art 163–64:	Design: Visual Communication
Art 179–80:	Sculpture II
Art 181–82:	Intermediate Photography
Art 189–90:	Sculpture III
	Total

BIOLOGY†

BiSc 11–12:	Introductory Biology for Science Majors
BiSc 101:	Invertebrate Zoology, or
BiSc 104:	Comparative Vertebrate Anatomy
BiSc 108:	Organic Evolution, or
BiSc 127:	Genetics
BiSc 128:	Genetics Laboratory
BiSc 140:	General Ecology
BiSc 163:	Human Physiology
BiSc 164:	Human Physiology Laboratory
BiSc:	Advanced Botany courses as approved by the adviser
Chem 11–12:	General Chemistry
Phys 1:	Foundations of Physics
Phys 2:	Introduction to Modern Physics
	Total

CHEMISTRY

‡Chem 11–12:	General Chemistry, or
Chem 15–16:	Intensive General and Analytical Chemistry
‡Chem 22:	Introductory Quantitative Analysis

* Art 21-22 or permission of Department Chairman is prerequisite to all other Fine Arts co
† Other courses recommended but not required—Chem 30, or 151-52 and 153-54; BiSc 185.
‡ Chem 22 required if Chem 11-12 is elected

		Semester Hours
Chem 110:	Introduction to Physical Chemistry, or	
Chem 111:	Physical Chemistry	3
Chem 134:	Descriptive Inorganic Chemistry	2
em 151–52:	Organic Chemistry	6
em 153–54:	Organic Chemistry Laboratory	2
Chem 191:	History of Chemistry	2
Math 6:	Plane Trigonometry	3
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Phys 1:	Foundations of Physics	4
Phys 2:	Introduction to Modern Physics	4
	Total	40–44

EARTH SCIENCE

BiSc 3:	Introductory Biology for Nonscience Majors	3
Chem 11–12:	General Chemistry	8
Geol 21–22:	Physical and Evolutionary Geology	6
Geol 101:	History of Geological Sciences	3
Geol 111:	Mineralogy	4
Geol 125:	Marine Geology	3
Geol 151:	Invertebrate Paleontology	3
*Math 3:	College Algebra	3
*Math 6:	Plane Trigonometry	3
Phys 1:	Foundations of Physics	4
ther Courses:	To be selected from the following as approved by the adviser	6–9
Anth 186:	Physical Anthropology of Modern Man	
Geol 122:	Structural Geology	
Geol 128:	Geomorphology	
Geol 141:	Introductory Geochemistry	
Geol 163:	Sedimentation	
Geol 189:	Geophysics for Geologists	
	Total	46–49

ENGLISH

Engl 9 or 10:	English Composition: Language as Communication	3
Engl 11:	English Composition: Language and the Arts and Sciences, or	
Engl 12:	English Composition: Language in Literature	3
Engl 52:	Introduction to English Literature	3
Engl 71–72:	Introduction to American Literature	6
Engl 101:	Expository Writing	3
Engl 115:	Introduction to English Linguistics	3
Engl 127–28:	Shakespeare	6
SPDR 11:	Voice and Diction	3

dditional mathematics is required for some advanced geology courses.

*Engl:	To be selected from the following as approved by th adviser
Engl 117–18:	English Poetry: Form and Content
Engl 133–34:	The Romantic Movement
Engl 135–36:	Victorian Literature
Engl 137–38:	The 20th Century
Engl 153–54:	The English Novel
Engl 155–56:	The English Drama
Engl 161–62:	Studies in American Literature
Engl 163–64:	Major American Poets
Engl 165–66:	American Drama
Engl 167–68:	The American Novel
Engl 171–72:	Major American Writers
Engl 173–74:	Selected Literary Movements
Engl 175–76:	Special Topics in American Literature
Engl 177–78:	Contemporary American Literature
	Total

FRENCH

Fren 9:	Expression orale du français contemporain, and
Fren 10:	Cours de Syntaxe, or
Fren 12:	French Conversation and Composition (Intensive)
Fren 51–52:	Survey of French Literature, or
Fren 91–92:	Analyse de texte
Fren 103:	Diction, phonétique appliquée
Fren 108:	Cours de grammaire avancée
Fren 109:	La Langue pratique
Fren 110:	Cours de stylistique
Fren:	To be selected from the following
Fren 119–20:	French Literature of the Middle Ages and the Renaissance
Fren 121–22:	17th Century French Literature
Fren 123–24:	18th Century French Literature
Fren 125–26:	19th Century French Literature
Fren 127–28:	20th Century French Literature
Other Courses:	Recommended from the following but not required
Art 109:	19th Century Art in Europe
Art 110:	Contemporary Art
Engl 115:	Introduction to English Linguistics
Foreign Lang:	Other than French as approved
Hist 141–42:	History of France
Psyc 115:	Psychology of Language and Communication
	Total

GENERAL SCIENCE†

BiSc 3–4:	Introductory Biology for Nonscience Majors

* Not required for the minor teaching field
† May not be chosen as a minor teaching field.

		Semester Hours
hem 11–12:	General Chemistry, or	
hem 15–16:	Intensive General and Analytical Chemistry	8
*Chem 22:	Introductory Quantitative Analysis	4
Phys 1:	Foundations of Physics and	
Phys 2:	Introduction to Modern Physics, or	
Phys 9–10:	Introduction to Astronomy	6–8
†Science:	Additional courses as approved by the adviser	10
Math:	To be selected from the following	9
Math 3:	College Algebra	
Math 6:	Plane Trigonometry	
Math 30:	Precalculus	
Math 31:	Calculus of One Variable	
Math 32:	Calculus of Several Variables	
Math 33:	Calculus of Vector Functions	
	Total	41–47

GEOGRAPHY

Geog 51:	Introduction to Geography	3
Geog:	To be selected from the following	21
Geog 125:	Transportation Geography	
Geog 127:	Population and Settlement	
Geog 132:	Resource Management and Conservation	
Geog 135:	Resources and Environmental Quality	
Geog 139:	Geographic Perspectives on Current World Problems	
Geog 140:	Urban Geography	
Geog 141:	Urban Settlement	
Geog 142:	Urban Environments	
Geog 143:	Social Geography	
Geog 144:	Environmental Adaptation	
Geog 145:	Cultural Geography	
Geog 146:	Political Geography	
Geog 161:	Latin America	
Geog 164:	Geography of China	
Geog 198:	Current Geographic Topics	
	Total	24

GERMAN

Germ 9–10:	German Conversation and Composition	6
Germ 51–52:	Introduction to German Literature—in English	6
erm 179–80:	Advanced German Conversation	6
†German:	Additional courses as approved by the adviser	14
	Total	32

hem 11-12 is elected, it must be followed by Chem 22. If Chem 15-16 is elected, Chem 22 is
quired however Chem 30 is recommended following Chem 16
ree semester hours in one science field are required for certification
required for the minor teaching field

HISTORY

Hist 39–40:	European Civilization in Its World Context
Hist 71–72:	Introduction to American History
Hist:	Research Seminar (see adviser, Department of History)
Hist:	Six semester hours in each of three of the followi groups as approved by the adviser
*Hist:	Additional semester hours from any one of the followi groups as approved by the adviser
	Total

Group 1: American History

Hist 167:	Man-made America: the Colonial Scene
Hist 169:	The American Revolution
Hist 170:	U.S. Early National History
Hist 171–72:	U.S. Social History
Hist 173–74:	Afro-American History
Hist 175–76:	U.S. Political History
Hist 177:	The Ante-bellum South
Hist 178:	Recent U.S. History
Hist 179–80:	U.S. Economic History
Hist 181–82:	U.S. Diplomatic History
Hist 185:	History of Women in America
Hist 186:	U.S. Urban History

Group 2: European History

Hist 108:	The Ancient Near East and Egypt to 322 B.C.
Hist 109:	Early Aegean and Greek Civilizations to 338 B.C.
Hist 110:	The Roman World to 337 A.D.
Hist 111–12:	Medieval History
Hist 113:	Byzantium and Its Neighbors
Hist 121:	The Renaissance in Western Europe
Hist 122:	The Reformation in Western Europe
Hist 131–32:	History of Germany
Hist 139–40:	World History in the 20th Century
Hist 141–42:	History of France
Hist 143:	Europe East of the Elbe, 1815–1939
Hist 144:	Medieval Russia
Hist 145:	Imperial Russia
Hist 146:	Soviet Russia
Hist 147:	Economic History of Europe
Hist 149–50:	European Diplomatic History
Hist 151–52:	History of England
Hist 153:	Tudor England
Hist 154:	Stuart England
Hist 157:	20th Century European Diplomatic History
Hist 158:	Modern Jewish History

* Not required for the minor teaching field.

Group 3: The Eastern World

Hist 138: History of World Communism
Hist 144: Medieval Russia
Hist 145: Imperial Russia
Hist 146: Soviet Russia
Hist 187: History of Modern China
Hist 188: History of Chinese Communism
Hist 189: History of Modern Japan
Hist 193: History of the Near East
Hist 194: History of the Modern Near East
ist 195–96: History of East Asia

Group 4: Latin American History

Hist 161: Revolution in 20th Century Latin America: the Mexican and Cuban Experience
ist 163–64: History of Latin America
Hist 165: History of Brazil
Hist 166: History of Mexico
PSc 177: Governments and Politics in Latin America
PSc 178: International Relations of Latin America

MATHEMATICS

		Semester Hours
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Math 32:	Calculus of Several Variables	3
Math 33:	Calculus of Vector Functions	3
Math 121:	Introduction to Abstract Algebra	3
Math 124:	Introduction to Matrix Theory	3
Math 135:	Projective Geometry	3
*Math:	Three additional second- or third-group courses in Mathematics approved by the adviser	9
Stat 97:	Introduction to Computer Programming	3
Stat 157–58:	Introduction to Mathematical Statistics	6
	Total	39

MUSIC

Mus 5–6:	Harmony	6
Mus 103–4:	History of Music	6
Mus 131–32:	Advanced Theory	6
plied Music:	Voice or major instrument	6
plied Music:	Minor instruments	6
Ensemble:	Choral or Orchestral	3
ic Literature or Music Theory:	As approved by the adviser	9
	Total	42

required for the minor teaching field.

PHYSICS

Math 30:	Precalculus
Math 31:	Calculus of One Variable
Math 32:	Calculus of Several Variables
Math 33:	Calculus of Vector Functions
Phys 14:	Introductory Mechanics and Thermal Physics
Phys 15:	Elements of Electricity and Magnetism
Phys 16:	Introduction to Modern Physics
Phys 161:	Mechanics I
Phys 163:	Physical and Quantum Optics
Phys 164:	Thermodynamics
Phys 165:	Electromagnetic Theory
Phys 167:	Principles of Quantum Physics
	Total

RUSSIAN

Slav 9–10:	Intermediate Russian Conversation and Composition
Slav 71:	Introduction to Russian Civilization
Slav 91–92:	Introduction to Russian Literature
Slav 141–42:	19th Century Russian Literature, or
Slav 151–52:	20th Century Russian Literature
Slav 197:	Methodology of Teaching Russian
Slav 198:	Russian Stylistics
*Slav:	Additional courses from the following as approved by the adviser
Slav 101:	Readings in the Soviet Press
Slav 103:	Scientific Russian
Slav 104:	Business Russian
Slav 109–10:	Advanced Russian Conversation and Composition
Slav 128:	Dostoevsky, the Man and the Artist
Slav 143–44:	The Russian Novel
Slav 146:	The Russian Short Story
Slav 153:	Turgenev
Slav 156:	Leo Tolstoy, His Life and Works
Slav 157:	Nabokov
Slav 158:	Solzhenitsyn
Slav 161–62:	Russian Culture
Slav 165:	Soviet Literature from the Revolution to World War II
Slav 166:	Soviet Literature from World War II to the Present
Slav 172:	Soviet Dissent
Slav 191:	Russian Literature to 1800
Slav 193–94:	The Other Slavs: Their Literature—in English
	Total

SOCIAL STUDIES

Econ 1–2:	Principles of Economics
Hist 39–40:	European Civilization in Its World Context

* Not required for the minor teaching field.

		Semester Hours
Hist 71–72:	Introduction to American History	6
Sc 4 or 5, 6:	Introduction to Political Science	6
er Courses:	To be selected from the following	6
Anth 1–2:	Introductory Anthropology	
Geog 51:	Introduction to Geography	
Geog 52:	Introduction to Economic Geography	
Soc 1:	Introductory Sociology	
Soc 2:	Major Social Issues	
her Courses:	Second-group courses, as approved by the adviser, from Anthropology, Economics, Geography and Regional Science, History, Political Science, and Sociology	12
	Total	42

SPANISH

Span 9–10:	Spanish Conversation and Composition, or	
Span 12:	Spanish Conversation and Composition (Intensive)	6
Span 51–52:	Survey of Spanish Literature and Civilization	6
Span 91–92:	Explicación de textos	6
pan 109–10:	Advanced Spanish Conversation and Composition	6
Span:	Two full-year courses selected from second-group Spanish or Spanish American Literature courses	12
her Courses:	Recommended from the following	6
Engl 115:	Introduction to English Linguistics	
oreign Lang:	Other than Spanish as approved	
Hist 161:	Revolution in 20th Century Latin America: the Mexican and Cuban Experience	
Hist 163–64:	History of Latin America	
Hist 165:	History of Brazil	
Hist 166:	History of Mexico	
Psyc 115:	Psychology of Language and Communication	
Span 193:	Curso de estilo	
Span:	Second-group courses in Spanish and Spanish American Literature not previously elected	
	Total	42

SPEECH AND DRAMA

SPDR 1:	Communicative Speaking and Listening	3
SPDR 11:	Voice and Diction	3
SPDR 32:	Oral Interpretation of Literature	3
SPDR 101:	Bioacoustics	3
SPDR 103:	Biophonetics	3
SPDR 112:	Persuasion	3
SPDR 121:	Group Discussion and Conference Leadership	3
SPDR 169:	Introduction to Creative Dramatics	3
Area of ecialization:	Selected from one of the following groups as approved by the adviser	12
	Total	36

equired for the minor teaching field.

GROUP 1: Speech Communication*

SPDR 126:	Argumentation and Debate
SPDR 127–28:	Advanced Debate Practice
SPDR 133:	Broadcasting in America
SPDR 134:	Radio Production and Performance
SPDR 143:	Origins of Contemporary Rhetorical Theory
SPDR 144:	History and Criticism of American Public Address

GROUP 2: Drama*

SPDR 115:	Acting I
SPDR 116:	Acting II
SPDR 151–52:	Stagecraft
SPDR 154:	Directing
SPDR 155–56:	Play Production Practice
SPDR 165–66:	History of the Theater

PROFESSIONAL COURSES†

Educ 108:	Human Development, Learning, and Teaching
Educ 112:	Educational Measurement
Educ 123:	Society and the School
Educ 131:	Secondary School Principles and Methods
Educ 134:	Student Teaching in Secondary Schools
Special Methods:	Three to six semester hours from the following courses
Educ 136:	Teaching English in Secondary Schools
Educ 137:	Teaching Speech
Educ 138:	Teaching Social Studies in Secondary Schools
Educ 139:	Teaching Art in Secondary Schools
Educ 140:	Teaching Mathematics in Secondary Schools
Educ 142:	Teaching Music in Secondary Schools
Educ 144:	Teaching Science in Secondary Schools
Educ 146:	Teaching Foreign Languages

Total

BACHELOR OF SCIENCE IN HUMAN KINETICS AND LEISURE STUDIES

The curriculum, which is designed to prepare students for teaching in e tary and secondary school programs, offers opportunities for specializa dance, elementary or secondary school physical education.

The student wishing to prepare to teach another subject in addition t above specializations may use elective hours to work toward a minor te field. Relevant work in Columbian College may be counted.

* Not required for the minor teaching field.
† A course in the teaching of reading is recommended since it is required for employment jurisdictions.

nisite

e first two years of the Bachelor of Science in Human Kinetics and e Studies curriculum, see Columbian College of Arts and Sciences, 82–83.

lization in Dance

JUNIOR AND SENIOR YEARS

		Semester Hours
Educ 108:	Human Development, Learning, and Teaching	3
Educ 112:	Educational Measurement	3
Educ 123:	Society and the School	3
Educ 134:	Student Teaching in Secondary Schools	6–9
KLS 109–10:	Dance Composition	6
HKLS 117:	Dance Education	3
KLS 135–36:	Dance History	6
KLS 141–42:	Theater Production for the Dance	4
HKLS 150:	Human Anatomy	3
HKLS 151:	Kinesiology	3
HKLS 164:	Physiology of Exercise	3
HKLS:	Additional semester hours to be selected from the following	9
HKLS 119:	Creative Dance for Children	
HKLS 120:	Repertory	
HKLS 129:	Introduction to Motor Learning	
HKLS 137:	Dance Notation and Movement Analyses: the Laban System	
HKLS 144:	Choreography	
Elective:		5–8
	Total	60

ialization in Elementary School Human Kinetics and Leisure Studies

JUNIOR YEAR

Educ 108:	Human Development, Learning, and Teaching	3
Educ 123:	Society and the School	3
HKLS 101:	Physical Education in the Elementary School	3
HKLS 102:	Movement Education	3
HKLS 113:	Field Experience: Practicum in Physical Education, Dance, or Recreation (Prerequisite for HKLS 133)	3
HKLS 130:	Motor Performance in Childhood	3
HKLS 138:	Physical Education Curriculum and Administration	3
HKLS 150:	Human Anatomy	3
HKLS 151:	Kinesiology	3
Elective:		6
	Total	33

SENIOR YEAR

Educ 112:	Educational Measurement
HKLS 114:	Field Experience: Practicum in Physical Education, Dance, or Recreation (Prerequisite for HKLS 133)
HKLS 129:	Introduction to Motor Learning
HKLS 133:	Student Teaching
HKLS 164:	Physiology of Exercise
Elective:	
	Total

Specialization in Secondary School Human Kinetics and Leisure Studies

JUNIOR YEAR

Educ 108:	Human Development, Learning, and Teaching
Educ 123:	Society and the School
HKLS 111–12:	Sports Education Technique
HKLS 113:	Field Experience: Practicum in Physical Education, Dance, or Recreation (Prerequisite for HKLS 133)
HKLS 138:	Physical Education Curriculum and Administration
HKLS 150:	Human Anatomy
HKLS 151:	Kinesiology
Elective:	
	Total

SENIOR YEAR

Educ 112:	Educational Measurement
HKLS 114:	Field Experience: Practicum in Physical Education, Dance, or Recreation (Prerequisite for HKLS 133)
HKLS 129:	Introduction to Motor Learning
HKLS 133:	Student Teaching
HKLS 164:	Physiology of Exercise
Elective:	
	Total

Graduate Study

THE SCHOOL OF EDUCATION OFFERS GRADUATE PROGRAMS leading to the degrees of Master of Arts in Teaching, Master of Arts in Education, Education Specialist, and Doctor of Education.

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aduate work, grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum
F, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit. Grades *A*,
and *F* are counted in computing the quality-point index (see page 46).
enever a grade has not been assigned, the symbol *I* (Incomplete) or the
l *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates
satisfactory explanation has been given to the instructor for the student's
to complete the required work of the course. An "Incomplete" cannot
de up after the lapse of one calendar year except by written permission of
ean's Council. An "Incomplete" which is not removed within one calendar
automatically changed to an *F*. An "Incomplete" cannot be removed by
tering for the course.

DEGREE OF MASTER OF ARTS IN TEACHING

chool of Education offers an intensive, interdisciplinary fifth year in
m education. This program is designed to prepare selected liberal arts
tes, postgraduates, and professionals for education work in a museum
liason work between museums and school systems. Students receive the
of Master of Arts in Teaching upon completion of the program.
details write the Chairman of the Department of Education, M.A.T.
m, School of Education, George Washington University, Washington,
0052.

ion

e admitted to the program in museum education an applicant must (1)
Bachelor's degree from an accredited institution; (2) submit three
references attesting to quality of academic record and work experience;
) be interviewed by the University Selection Committee or make alter-
arrangements specified by the Committee and approved by the Dean
School of Education. Considered essential are skills in communication,
e to study and learn from the artifacts of nature and civilization, and
ity for and interest in working with people. Evidence of strong under-
e, graduate, or professional experience in such fields as American his-
eology, art, or the social sciences will be considered favorably.

Study for the Museum Education Program

gram begins with a six-week summer session. Emphasis is on the study
ums and communication skills. During the fall semester students study
ool as an institution—its organization, pupil population, staff and
—and as a laboratory, where they will work in classrooms with students
chers. The program will also focus on other museum audiences. Stu-
ill earn at least 12 semester hours of credit in an academic concentra-
During the spring semester students will have an internship in area
art or history museums.

THE DEGREE OF MASTER OF ARTS IN EDUCATION

Programs of study leading to the degree of Master of Arts in Edu
designed to enable prospective teachers and teachers of experience t
their knowledge of professional and academic information and skills
pare for special types of educational service. They also provide opport
college graduates in other disciplines to acquire needed professional e
as well as study in the subjects which are directly related to their pr
objectives.

From the various related departments of the University, the studen
adviser select courses to give the student an adequate background in th
field of service. Programs for teachers-in-service and experienced teach
ning to re-enter the profession are differentiated from those for students
teaching experience.

Master's programs are available in the following fields:

Adult Education
College Student Development
Curriculum
Early Childhood Education
Elementary Administration
Elementary Education
Guidance and Counseling
Generic Counseling
Higher Education
Human Resource Development
Human Kinetics and Leisure Studies (candidates may specialize in adaptive physical education, dance, elementary or secondary school physical edu therapeutic recreation, tourism or urban recreation and parks)
Reading
Rehabilitation Counseling
Secondary Administration
Secondary Education
Special Education (candidates may specialize in crisis-resource teach diagnostic-prescriptive teaching, early childhood special educatio
Supervision and Human Relations

For teachers interested in developing or strengthening their academ petence, the elementary and secondary education fields normally pe to 18 semester hours of work in departments other than education. programs are designed to meet the needs of teachers-in-service who nee tional work in content to qualify for advanced certification or to impro classroom skills and may also be helpful to previously trained teacher ning to re-enter the profession. The major emphasis is upon strengthen the academic and professional competencies of the teacher.

Additional information concerning these programs may be obtai writing or telephoning the Office of the Dean.

Entrance Requirements

A bachelor's degree from an accredited institution, an undergraduate point index of 2.50 or above ($C+$ average), demonstrated interest in ing, and personality traits that give promise of success as a teacher. quired. In a number of programs there are more applicants than accepted; therefore, selections by additional criteria are necessary.

Two years of successful teaching are required before admission to ca in the field of school administration. Experience is required for admis programs in adult education and human resource development.

ISSION TO CANDIDACY

lidates whose undergraduate preparation does not include equivalents of basic requirements for the degree of Bachelor of Arts in Education must e up deficiencies and may be required to take designated tests.

ANCED STANDING

the record, advanced standing is granted for approved courses taken at r accredited institutions, but a minimum of 30 semester hours must be pleted at this University as a master's candidate.

maximum of 12 semester hours of advanced courses completed in this versity in excess of the requirements for the bachelor's degree may be ited toward the master's degree if the work fits in with the student's plan pecialization.

Advanced standing is not granted for work completed five or more years ore application for admission or readmission to master's candidacy.

uirements for the Degree

AN OF STUDY

e plan of study leading to the degree of Master of Arts in Education requires inimum of 33 hours of graduate credit. The plan may, at the student's op-, include a thesis carrying 6 hours of graduate credit. Whether or not a stu- t selects the thesis option, a minimum of 18 hours must be from courses nned primarily for graduate students (third-group courses). The 18 hours st include a course in research methods and procedures. A minimum of 12 rs, not including the thesis or the research course, must be from courses red by the School of Education.

rograms may include additional teaching-field preparation. In such cases, vever, undergraduate and graduate courses combined must be at least equiva- to the undergraduate requirements for the degree of Bachelor of Arts in cation (see pages 112–26).

rograms are planned initially in conference with an admission adviser in the ce of the School of Education and subsequently with a designated adviser he candidate's area of specialization. These programs are based on the idate's interests and background and on the certification requirements of state and locality in which the candidate plans to teach.

ll degree requirements must be completed within a period of six years.

DENCE

andidate for the master's degree is required to complete satisfactorily 30 ester hours in residence in the School. With the approval of the adviser, 9 e 30 hours may be off-campus courses in the College of General Studies.

OLARSHIP

uality-point index of 3.00 is required for graduation. Students who re- the grade of *C* in more than 6 semester hours are subject to suspension.

Students who receive a grade of *F* must confer with the Dean of the S
Education before enrollment for further work.

THE THESIS

The choice of the thesis subject must be approved in writing by the stud
viser and filed in the Office of the Dean. A statement of the School of
tion standards for the thesis and printed copies of detailed regulations re
the form and reproduction of the thesis are available in the Office of th

Payment of tuition for the thesis entitles the candidate, during the p
registration, to the advice and direction of the member of the faculty
whom the thesis is to be written. In case a thesis is unfinished, an ad
calendar year may be granted without further tuition payment. The
must, however, maintain continuous registration (see page 49) durin
period. If the preparation of the thesis extends beyond the additional ca
year, the student must register for the entire 6 hours of thesis again a
tuition as for a repeated course.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to the course examinations, the candidate must pass a special
hour examination on the chosen area of specialization. Candidates for
amination must be registered for the semester it is to be taken, and mus
written application in the Office of the School of Education no later th
days prior to the date of the examination.

THE DEGREE OF EDUCATION SPECIALIST

The School of Education provides a program of advanced study lead
the degree of Education Specialist for students with Master's degrees in E
tion who seek further professional preparation for specific objectives.

Education Specialist programs are available in the following fields:

Administration
Adult Education
Curriculum
Counselor Education
Elementary Administration
Higher Education
Secondary Administration

Entrance Requirements

The degree of Master of Arts in Education from this University (or the eq
lent), a satisfactory score on the Miller Analogies Test or the Graduate Re
Examination, or grades in graduate coursework which meet standards
the Advanced Graduate Faculty, and two years of successful pertinent e
ence, are required.

Admission to Candidacy

Each applicant must be interviewed and recommended by a staff member
School of Education or by a representative in the candidate's locality appr
by the Dean.

Scholarship

Scholarship requirements for the degree of Education Specialist are the same as those for the degree of Master of Arts in Education (see pages 131–32).

Programs of Study and Degree Requirements

Individual programs are developed, through the faculty-adviser plan, to fit the candidates' abilities, interests, needs, and career goals. A minimum of 30 semester hours beyond the requirements of the degree of Master of Arts in Education at this University is required. At least 21 hours of this work must be taken on campus at this University; with the approval of the adviser, the remaining semester hours of the program may be taken in off-campus offerings of the College of General Studies or at another approved university. A maximum of five calendar years is allowed for completion of the program.

At least 12 of the required 30 hours must be in appropriate graduate courses in Education selected from the following areas: (1) foundations and cognate study, (2) background and general principles of the field of study, (3) an area of specialization.

COMPREHENSIVE EXAMINATION

Successful completion of a six-hour written examination and/or an oral examination, at the option of the major field adviser, is required.

THE DEGREE OF DOCTOR OF EDUCATION

The School of Education offers programs of advanced study leading to the degree of Doctor of Education. These programs, which are under the supervision of the Advanced Graduate Faculty, provide major fields of study in higher education, special education, counselor education, administration and curriculum, adult education, human resource development, and higher education. Supporting fields are available in administration, administration of higher education, adult education, college student development, counselor education, curriculum, elementary education, higher education, human growth and development, human resource development, reading, secondary education, special education, supervision, and teacher education. With the approval of the Advanced Graduate Faculty and the departments concerned, one supporting field may be taken in other departments of the University. All programs require study of interrelated areas of education and a doctoral dissertation in the major field of study.

Admission

The applicant must have adequate preparation for advanced study, including graduate work in fields prerequisite to the objective equivalent to that required for the degree of Master of Arts in Education at this University, at least three years of successful pertinent educational experience, acceptable personal qualities, and a capacity for creative scholarship and effective leadership.

The applicant first arranges for an interview with the Assistant Dean for advanced graduate studies to explore the applicant's needs in relation to the resources of the School and to guide the student in applying for doctoral study.

The required admission procedures and standards will be explained at t
Candidates meeting the initial standards are admitted to precandidacy
degree.

PRECANDIDACY

In the precandidacy period a minimum of 9 semester hours of cou
in the program, including requirements specified by the Advanced
Faculty, must be completed. This work must be completed within t
mesters of admission to precandidacy, for part-time students, or w
first 18 semester hours of course work for full-time students. Applic
full candidacy will then be decided on the basis of the quality of sch
in the precandidacy period, the recommendations of instructors, a
plan for the balance of the program, and a qualifying examination.

Plan of Study

In general, from two to three years of full-time study beyond the d
Master of Arts in Education, or the equivalent in part-time study, are
Programs are individually planned. It is estimated that, for the average
the work required for the total program will be 75 semester hours, i
a minimum of 12 semester hours of dissertation research.

Each program is divided into two parts. The first consists of prepar
comprehensive examinations in a major field of study and two su
fields, and completion of a required research tool field. The second
posed of research investigation, the writing of a dissertation, and the
examination.

Students who have completed the comprehensive examinations and w
not registered for doctoral study under the payment plan in effect prio
1, 1967, must register for a minimum of 6 semester hours of Dissert
search (Educ 491) a semester until 12 hours have been completed, and
mum of 3 semester hours a semester thereafter until the satisfactory co
of the final examination.

COMPREHENSIVE EXAMINATIONS

Upon admission to doctoral candidacy the student is assigned to a co
each member of which is responsible for guiding the preparation for
the required comprehensive examinations in supporting fields or the ma
comprehensive examination. The candidate must arrange individual
ences with the committee members to determine the content of each
to receive guidance in preparation for the examination.

The supporting field examinations, which are taken first, are three-h
ten examinations. In addition to the research tool field a student w
a historical research investigation for the dissertation must complete
propriate research seminar offered by the Department of History.
dent's Dissertation Committee may recommend other tool requirem
tool requirement must be completed prior to the major field examinat
major field examination is a written 12-hour examination, six hours
of two successive days.

candidate begins the second part of the program after the satisfactory
ion of all supporting field examinations, the required research tool field,
major field examination.

SSERTATION

rtation is required as evidence of ability to perform scholarly research
nterpret and present its results.
ng the first part of the program, the Dean appoints a Dissertation Com-
consisting of a major adviser as Director, usually the major field adviser,
o additional faculty members who serve as readers. The candidate is re-
to submit a proposal for the dissertation to this Committee, which deter-
its acceptability and recommends approval to the Committee on Ad-
Graduate Studies. The dissertation is completed under the guidance
Director, with the advice of the other members of the Dissertation
ttee.
ater than the date specified in the calendar, the candidate must submit to
an five complete copies of the dissertation and two copies of an
for inclusion in the announcement of the examination and for repro-
by University Microfilms, Inc. Printed copies of detailed regulations
ng the form and reproduction of the dissertation, preparation of the
, and services offered by University Microfilms, Inc., are available in the
of the Dean. The successful candidate for the doctorate is required,
receiving the degree, to pay a fee to cover the expense of printing the
ncement of the Final Examination, and for the basic service rendered
versity Microfilms, Inc., and to sign a microfilm agreement.

NAL EXAMINATION

he dissertation has approval of the Director, the candidate is recom-
to the Dean for the final oral examination, which must be passed at
ree weeks before the degree is to be conferred. The examination is open
ublic and is conducted by a committee of the Faculty, appointed by the
supplemented by at least two leaders in the candidate's field of study
utside the University. Candidates who successfully pass the oral exami-
are recommended for the degree by the Faculty of the School of Educa-

ice and Continuous Study

preparation for the degree, including examinations, courses, seminars,
er work done under the direction of an adviser, must be done in resi-
The student must remain registered in the School of Education, except
he Dean or the Advanced Graduate Faculty has granted a leave of
. Failure to register each semester of the academic year may result in
f candidacy. Subsequent readmission is subject to whatever new condi-
nd regulations have been established by the Advanced Graduate Faculty.
supporting and major field examinations must be completed within five
of the date of admission, and the entire program must be completed
eight years, regardless of full-time or part-time study. All candidates
atisfy one of three options for full-time study. Information concerning

these plans will be provided by the Assistant Dean for advanced gradua upon request by the candidate.

Special Programs and Services

EDUCATION OF TEACHERS OF EXCEPTIONAL CHILDREN

THE SCHOOL OF EDUCATION offers a program for the education of tea exceptional children. Laboratory experiences are arranged in schools fo capped children in the metropolitan area. Students are accepted at the or senior-year undergraduate, Master's, Education Specialist, and D levels. By special permission, teachers, school administrators, and ad prepared students from other schools and colleges of the University m these courses. Inquiries concerning the program and the availability of ships and fellowships should be directed to Dr. Perry Botwin, Depart Special Education, George Washington University, Washington, D.C.

GRADUATE PROGRAM IN REHABILITATION COUNSELING

The School of Education offers a federally funded Master's degree p for the preparation of rehabilitation counselors. These professional p assist persons who are disabled or disadvantaged to assume a proper r society. The two-year program combines fieldwork with course work paring students for immediate employment in an expanding field that high humanitarian and financial rewards. Both the profession and the p are interdisciplinary, drawing upon such related areas as guidance, me psychology, social work, sociology, and special education.

Inquiries concerning the program, the availability of traineeships f time students and applications should be directed to Dr. Daniel Sinic habilitation Counselor Education, George Washington University, Wash D.C. 20052.

GRADUATE SPECIALIZATION IN THERAPEUTIC RECREATIO AND ADAPTIVE PHYSICAL EDUCATION

The School of Education offers a federally funded master's degree prog the field of physical education with a specialization in therapeutic recrea adaptive physical education. This program is funded by the Bureau of E tion for the Handicapped, U.S. Office of Education. Both programs r an intensive internship (minimum of 510 clock hours) in University af training centers in Washington area hospitals, schools, clinics, and agencies. Inquiries concerning this program and the availability of gr research assistantships and internships should be directed to Dr. Dou Hawkins, Department of Human Kinetics and Leisure Studies, George ington University, Washington, D.C. 20052.

TIFICATION CURRICULA

School of Education provides individually planned programs for liberal arts ates with appropriate degrees who wish to prepare for teaching. Those ng certification, but not wishing to work for a degree, may enroll in a cation program if they meet the admission, scholarship, and personality rements of degree candidates. The School also provides a wide range of es of interest to teachers who wish to renew licenses.

DING CENTER

pages 53–54)

CAMPUS DEGREE PROGRAMS

School of Education has academic jurisdiction over the off-campus pro- s leading to the degree of Master of Arts in Education in the fields of ntary administration; elementary education; higher education; human rce development; secondary administration; secondary education; special tion—crisis-resource teaching, diagnostic-prescriptive teaching, early hood special education; and supervision and human relations.

ese degree programs are administered by the College of General Studies. details concerning the off-campus programs see the *College of General* 's Catalogue.

SCHOOL OF GOVERNMENT AND BUSINES ADMINISTRATION

Dean P.B. Vaill
Associate Dean H.R. Page
Assistant Deans K.J. Darr, J. Lobuts, Jr.

FACULTY*

Professors F. Amling, F. Belaunde-Terry, G. Black, H.F. Bright, D.S
M.C. Devolites, R.B. Eastin, R.F. Ericson, L. Gintzig, P.D. Grub, J.
P.M. Horvitz (*Visiting*), J.L. Jessup, G.P. Lauter, E.J.B. Lewis, G.L.
N.M. Loeser, A.J. Mastro, D.C. McGrath, Jr., H.R. Page, D.D. Roma
Sedwick, E. Timbers, P.B. Vaill, R.H. Walther (*Research*), M.M.
J. Zwick
Adjunct Professor F. Gutheim
Associate Professors E.B. Adams, R.R. Bonato (*Research*), J.H.H. Ca
S.R. Chitwood, J.P. Coyne, K.J. Darr, S.F. Divita, R.F. Dyer, R.
S.S. Fuller, M.G. Gallagher, S. Greene, J.J. Hampton, W.W. Ha
M.M. Harmon, R.L. Holland, F.C. Kurtz, J.F. McCarthy, Jr., C.R
G.E. Morris, C. Paik, P.N. Reeves, T.E. Shaughnessy, S.N. Sherm
Smith, E.K. Winslow
Adjunct Associate Professors P.S. Birnbaum, H.C. Demoody, A.J.
R.L. White
Assistant Professors G. Bodnar, B.L. Catron, B. Dawson, I. Dubinsky,
W.H. Guy (*Research*), J. Lobuts, Jr., G.J. McHugh, J.M. Sachl
Shouldice, H.A. Tombari, S. Umpleby, K.C. Yang (*Research*)
Adjunct Assistant Professors J.D. Bentley, P.J. Collier, W.J. Green,
Landen
Instructors D.F. Bergwall, P.A. Cleary (*Research*), C.P. McKelve
Miller, R. Switalski (*Research*)
Adjunct Instructors D.M. Ambrose, R.W. Black, F.W. Carter, G.R.
C.H. Hayes, S.T. Fisher

COMMITTEES†

DEAN'S COUNCIL

S.S. Fuller (*Chairman*), B.L. Catron, J.P. Coyne, M.C. Devolites,
D.D. Roman

* The President of the University, the Vice President for Academic Affairs, the Re
University, the Director of Admissions of the University, and the University Librarian a
members of the Faculty of the School of Government and Business Administration.
† The Dean of the School is an ex officio member of all committees.

ITTEE ON CURRICULUM AND PROGRAMS

age (*Chairman*), F. Amling, E.B. Adams, D.S. Brown, D.C. McGrath, F.C. Kurtz, P.N. Reeves

ITTEE ON DOCTORAL STUDIES IN BUSINESS ADMINISTRATION AND C ADMINISTRATION

auter (*Chairman*), I. Dubinsky, S.S. Fuller, L. Gintzig, W.W. Hardgrave, I. Loeser, A.J. Mastro

ODUCTION

chool was organized as the School of Government in 1928. During the wo decades, programs in business administration and public administra- ere added, and the emphasis gradually shifted from undergraduate to te study. The name was changed in 1960 to the School of Government, ss, and International Affairs to reflect more accurately the offerings of hool. A division of the School was effected in 1966, and two schools stablished– the School of Government and Business Administration, a ily professionally-oriented school; and the School of Public and Interna- Affairs, a primarily policy-oriented school.

ives

incipal objective of the School of Government and Business Administra- to prepare its graduates for positions in the management of complex or- ions in both business and government. The degree programs are de- to prepare students both for *entrance* into business and government and *ancement* to high-level management positions.

rams in the School include examination of administrative principles and ative approaches to decision-making common to both business and gov- t. These programs stress the points at which major policy decisions of business or government must give consideration to related policy deci- f the other. Emphasis is placed on the fact that management education limited to organizational techniques but is, in the broadest sense, educa- r management responsibility.

the policy of the School to emphasize a broad fundamental education best preparation for positions carrying management or administrative ibility.

rgraduate programs concentrate the first two years in a broad liberal arts lum drawn from the social sciences, humanities, quantitative methods, limited number of courses in administration. Students in the junior and years expand their work to include (1) the functions of business enter- 2) the economic and legal environment of business, (3) the implications dern analytical techniques based on quantitative methods, (4) the study nization theory and human relations, and (5) the practice of problem- techniques.

duate programs develop the elements common to all management posi-

tions regardless of the nature of the operation. Master's degree prog
based on study of the principles of management, human relations,
lem-solving plus an area of specialization.

The student body is comprised of both full- and part-time studen
necessitates the scheduling of classes both during the day and in eveni
normal working hours. All students should anticipate some evening
The presence of working students is viewed as an enrichment of the
class sessions.

Responsive to the needs of the Washington community, the Schoo
lowed the policy of making many of its educational activities availab
campus centers in and around the metropolitan area of Washington.
campus work leads to a degree carrying a different designation; thus, th
lor of Business Administration degree on campus has a substantial eq
to the Bachelor of Science in Administration degree offered off campus
ties furnished by government or business organizations. The School is
a Bachelor of Science in Health Care Administration degree, at
limited to students at the Naval School of Hospital Administration,
Md. The Master of Arts in Health Care Administration, Master of
Administration, Master of Public Administration, Master of Urban
ional Planning, and Master of Arts in Government degrees are of
campus, while the Master of Science in Administration degree is
graduate degree offered off campus. The off-campus programs hav
support in the area and provide significant contact with the business
ernment communities. Programs of study leading to the degrees of
of Science in Administration and Master of Science in Administr
listed in the *College of General Studies* Catalogue.

Academic Status

The School of Government and Business Administration has maint
membership in the Middle Atlantic Association of Colleges of Busines
istration since 1961. It joined the Council on Graduate Education fo
Administration in 1966. In 1968, the School became a member of the
Assembly of Collegiate Schools of Business. The programs in accounti
the educational requirements for the Certified Public Accountant and
Management Accountant professional examinations. The program in
administration is accredited by the National Accrediting Commission o
tion for Health Services Administration. The Master of Urban and
Planning degree program is recognized by the American Institute of

Common Body of Knowledge

Programs leading to the degrees of Bachelor of Business Administration
lor of Science in Administration and Master of Business Administration
the equivalent of at least one year of work in the following areas:

1. A background of the concepts, processes and institutions in m
and distribution, production and financing functions.

2. A background of the economic and legal environment of busi
government enterprise, along with consideration of the social and pol
fluences on business.

A basic understanding of the concepts and methods of accounting, quantimethods, and information systems.

A study of organization theory, interpersonal relationships, control and tion systems, and communications.

A study of administrative processes under conditions of uncertainty, ing the integration of analysis and policy determination at the over-all mant level.

ships

chool of Government and Business Administration has several graduate hips available to its students, including the Aryamehr Research Fellown International Business, Health Care Administration Fellowships, Ernst rnst Grant to Doctoral Candidates in Business or Economics, the National ation of Purchasing Management Fellowship, the Scottish Rite Foundaellowships and the Wolcott Foundation Scholarships.

LATIONS

tions concerning ADMISSION, REGISTRATION, FEES AND FINANCES *are on pages 21–34; other University regulations, on pages 45–52.*

ance

dent may not attend classes until registration is completed and fees due d. A student may be dropped from any course for undue absence.

student is held responsible for all the work of the courses in which red, and all absences must be excused by the instructor in charge before on is made for the student to make up the work missed.

udent suspended for any cause may not attend classes during the period pension.

awal

awal from a course or from the University without academic penalty is ed during the first four weeks after registration for the fall or spring er. Withdrawal after this period is permitted only in unusual circum-, and requires certification by the instructors of courses for which the is registered that the student is doing passing work (see "Withdrawal," 7).

Courses

s may not be added after the first full week of classes in any semester or r session.

ndent Study Plan

ent of *demonstrated capacity*, with a special interest in the subject matter urse, may be permitted to undertake study under the personal direction

of an instructor, in accordance with the rules of the appropriate de
Credit under this plan is limited to the specific course credits normall
when taken on a class basis.

The Bachelor of Business Administration Degr

THE SCHOOL OFFERS PROGRAMS leading to the degree of Bachelor of
Administration in the fields of Accounting and Business Administration.

ENTRANCE REQUIREMENTS

Good character and an academic background appropriate for the pro
studies contemplated are required.

Requirements for admission to the freshman class are as follows:

(A) 1. An acceptable certificate of graduation from a U.S. se
school, showing at least 15 units* which must include four years of
at least two years of one foreign language; two years of science, pr
with laboratory instruction; two years of social studies, one of which
American history; and two years of college preparatory mathematics.
admitted with deficiencies in secondary school units will be required
removing such deficiencies by appropriate courses or examinations w
first year in which they are enrolled in this University.

International students may be considered for admission with an eq
foreign secondary certificate. A student presenting such a certificate m
show competence in the English language and may be required to en
full-time program in English before beginning studies in a degree pro

2. College Entrance Examination Board scores submitted on the S
Aptitude Test and the English Composition Achievement Test.

It is recommended that the examinations be taken in December or J
Scores on tests taken in the junior year may be submitted. Arrangem
tests are the responsibility of the applicant and should be made
Educational Testing Service, 20 Nassau St., Princeton, N.J. 08540.
Center St., Berkeley, Calif. 94704, not less than one month before
of the test. In applying for the test, the applicant should specify
scores be sent to the Office of Admissions, George Washington Un
Washington, D.C. 20052.

The College Entrance Examination Board tests are preferred; howe
American College Testing battery scores will be accepted. The a
should request that these scores be sent to the Office of Admissions
from the American College Testing Program, Iowa City, Iowa. It is
mended that the applicant take the tests in October of the senior year

The School of Government and Business Administration will consi
adequacy of the qualifications of an applicant who, because of unusu
cumstances, does not present all of the formal requirements stated abo
School may prescribe appropriate scholastic-aptitude tests of the Univ

* A unit represents a year's study in a secondary school subject, including in the aggreg
than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

) Students who have been out of secondary school for three years or and/or do not meet the above requirements may take a special battery dmission tests* by contacting the Office of Admissions or may be con-ed for admission to the School of Government and Business Administra-on a conditional basis. To be admitted into the School's degree program, nditionally admitted student must complete a trial program of 15 semester s of course work with a quality-point index of 2.5 or higher. This trial ram must include one course each in accounting, economics, English and ce, to be selected from the first-year curriculum of the Bachelor of Busi-Administration degree program.

he selection of courses to be taken in the trial program must be made in erence with a faculty adviser in the School of Government and Business inistration. A conference concerning plans for study as a degree candidate quired of each applicant at the beginning and end of the trial program. n successful completion of the trial program, the student who has sub-ed a degree-candidate application will be advanced to degree status.

ission with Advanced Standing

uirements for admission of students transferring from other regionally ac-ited colleges and universities, and from other divisions of this University, s follows:

A) Students who have accumulated 30 hours or more of academic credit nother regionally accredited college or university in which they earned a or higher quality-point index may be admitted to the School of Govern-and Business Administration. Advanced standing may be awarded for erly certified courses taken at regionally accredited colleges or universities which the student received a grade of *C* or better, and may be applied rd a degree provided they are comparable to the curricular requirements e degree.

no case will more than 60 semester hours of advanced standing be granted ourse work completed at regionally accredited community or junior col-. Accounting and business administration courses taken at such colleges be applied toward the Bachelor of Business Administration degree pro-they are comparable to BAd 161, Mgt 118, 119, or Stat 97. Other es (one course per area up to a maximum of three courses), comparable is School's courses numbered 101-200, taken at an accredited community nior college where a grade of *C* or better has been earned may be accepted aive certain required courses. The waiver of a required course does not e the student to any semester hours of credit.

though a grade of *D* is not acceptable for transfer, the course may be to satisfy a curricular requirement. Credits earned with a *D* grade may however, be counted toward the total number of semester hours required he degree. Any course completed with a grade of *D* or better may not peated for the purpose of earning degree credit.†

tests include, among others, the Differential Aptitude Test, Cooperative English Examination hio Psychological Test.

xception to this rule is the freshman English composition requirement. Any student earning e lower than *C* in English composition at another institution may be required to repeat the s at this University.

The School reserves the right to refuse credit for transfer in wh
part or to allow credit provisionally.

It is the responsibility of the student to have an official transc
directly from each institution formerly attended to the Office of Ad
George Washington University, Washington, D.C. 20052.

(B) Students may transfer into a degree program in the School of
ment and Business Administration after completing at least 12
semester hours in another degree-granting division of this University
the student has an accumulated quality-point index of 2.00 or highe
time of transfer. A student wishing to transfer into the School from
division of this University must submit a formal application of transfe
Office of Admissions.

Courses taken at another division of this University may be applied
a degree in this School provided they are comparable to the curricular
ments of the degree. A maximum of 90 semester hours of transfer cre
be applied toward a degree program in this School.

In no case will credit for more than 15 semester hours of underg
coursework taken at this University before admission as a candidate
degree of Bachelor of Business Administration be allowed toward
degree requirements in the School of Government and Business Adm
tion.

(C) Students applying for transfer from another accredited college
versity or from another division of this University whose previous ac
records raise doubts of their ability to complete degree requirements
fully may be admitted to the School of Government and Business Adm
tion on a conditional basis. To be admitted into the School's degree p
a conditionally admitted student must complete a trial program of 15
hours of course work with a quality-point index of 2.5 or higher. A
registered in another division of this University who has an accu
quality-point index of less than 2.00 and who is conditionally admitted
School must earn a 2.5 quality-point index in the trial program an
during this trial program bring the accumulated quality-point index
or higher to be admitted to the School's degree program.

The selection of courses to be taken in the trial program must be
conference with a faculty adviser in the School of Government and B
Administration. A conference concerning plans for study as a degree
date is required of each applicant at the beginning and end of the tri
gram. Upon successful completion of the trial program, the student w
submitted a degree-candidate application will be advanced to degree st

Readmission

A student who withdraws, is suspended or is otherwise absent from th
versity for one semester or more must make formal application for readm
If readmitted, the student is subject to the rules and regulations in fo
the time of return. If the student has attended one or more regionally acc
colleges or universities during absence from the University, complete
transcripts must be sent to the Office of Admissions from each ins
attended.

The application fee is waived for a student applying for readmission wh

ed as a degree candidate at the time of last registration at the Uni- and who has not since registered at another college or university.

REQUIREMENTS FOR THE DEGREE

mic Work Load

-time student not on probation may not ordinarily take more than 15 er hours. A student employed more than 24 hours a week, who is not bation, may not take more than 9 semester hours.

full-time student whose overall quality-point index is 3.5 or higher may p to 18 semester hours. A student employed more than 24 hours a week, index is 3.50 or higher, may take up to 12 semester hours.

tudent who accepts employment after registration or at any time during a ter must report immediately to the Dean, so that the program may be ed if necessary.

ception to these rules will require the approval of the Dean.

undergraduate student on probation may take no more than 12 semester of course work.

arship Requirements

raduate, a student must have the following: (1) a general quality-poin of at least 2.00 and (2) a quality-point index in the major of at least All courses in the Bachelor of Business Administration degree major or n are to be included in the quality-point index calculation. Elective es in or out of the School of Government and Business Administration ot be used as substitutes in the major quality-point index calculation.

'S HONOR LIST

names of students who achieve a quality-point index of 3.50 or higher are d on the Dean's Honor List for that semester. Appearance on the list will nited to (1) full-time students registered for a minimum of 12 semester and (2) part-time students registered for a minimum of 12 semester hours a period of two consecutive semesters, which may include a summer term.

MPLETE/AUTHORIZED WITHDRAWAL

itions under which the grades of *I* (Incomplete) or *W* (Authorized With- al) may be assigned are described on page 46.

moving an Incomplete.—The grade of *I* must be removed no later than st day of the examination period for the fall or spring semester immedi- following the semester or summer session in which the grade of *I* is as- d. An "Incomplete" that is not removed within this period is automatically ged to an *F*. In cases of well-documented extenuating circumstances, an ctor and a student may jointly petition the Dean, or the appropriate com- e, for additional time in which to complete the work of the course. Such ons should be submitted within the same period. The grade of *I* cannot moved by reregistering for the course here, or by taking its equivalent here.

PROBATION

A student whose cumulative quality-point index falls below 2.00 after co
a minimum of 12 semester hours of study will be placed on probati
probation extends over the period in which the student attempts 12
hours of work, which may include remedial studies as prescribed.

SUSPENSION

A student whose quality-point index is 1.50 or below or whose index
below 2.00 at the end of the probationary period may be suspended. A
suspended for poor scholarship may apply for readmission after the
either the fall or spring semester. To be considered for readmission, the
must pass prescribed tests and submit evidence to the Dean's Council
duct during absence from the University which indicates that the stud
profit from readmission. A student readmitted after suspension is on
tion and must maintain a current quality-point index of at least 2.50 on
semester hours of work undertaken until the cumulative index is 2.00.
case will the probationary period after readmission exceed 24 hours o
A student suspended twice for poor scholarship will not be readmitted.

Credit/No Credit Option

A junior or senior student who has a cumulative quality-point index of
better, may, with the approval of the adviser and the Dean, take one co
semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which wil
corded on the student's transcript but will not be reflected in the quali
index. No student will be allowed to take more than four credit/no
courses. A student must sign up for such an option at registration. Un
circumstances may a student change from credit no credit status to
status, or vice versa, after the end of registration. Courses required in th
dent's major field may not be taken on the credit no credit basis. A tr
student may not choose this option until the second semester of enrollm
this University.

Residence

A minimum of 30 semester hours, including at least 12 hours in the major must be completed while registered in the School of Government and Bu Administration. This requirement applies to students transferring with University as well as to students transferring from other institutions. Su work may be counted toward the residence requirement, but in no case ma period of residence aggregate less than thirty weeks. Unless special permi is granted by the Dean to pursue work elsewhere, the work of the sen final year must be completed in the School of Government and Business ministration.

Use of Correct English

Any student whose written or spoken English in any course is unsatisfac may be reported by the instructor to the Dean. The Dean may assign st mentary work, without academic credit, varying in amount with the need

udent. If the work prescribed is equivalent to a course, the regular tuition charged. The granting of a degree may be delayed for failure to make ch deficiency in English to the satisfaction of the Dean.

espondence and Home-Study Courses

it for correspondence or home-study courses is not acceptable and cannot pplied toward a degree in the School of Government and Business Adstration.

RNING CREDIT OR WAIVING QUIREMENTS BY EXAMINATION

tudent may earn credit up to a maximum of 30 semester hours or waive icular requirements by performing satisfactorily on the following tests:

ollege-Level Examination Program (CLEP).—CLEP offers two types of minations: (1) CLEP Subject Examinations are offered in 29 subject s. These tests measure achievement in the equivalent of specific college- courses. (Credit may not be earned by passing the examination after ng taken the equivalent course). CLEP examinations in Introductory Acting, Introduction to Business, Commercial Law, and Data Processing are ted to three credits each of advanced standing. All other CLEP examinas in Accounting and Business Administration (School of Government and ness Administration courses) are not accepted for advanced standing. Stus enrolled in George Washington University who wish to receive credit CLEP Subject Examinations must receive prior approval of the depart-t. (2) CLEP General Examinations are offered in five areas: mathematics, al sciences, humanities, the natural sciences and English composition. edit—advanced standing—is not given for the General Test in English position.)

dvanced Placement Tests.—See page 23.

chievement Tests.—See pages 24–25.

xaminations for Waiving Curriculum Requirements.—The School of Govnment and Business Administration does not administer waiver examinations. wever, certain liberal arts courses may be waived, and in some instances lit may be assigned, by satisfactorily passing a special departmental examion authorized and prescribed by the department or curricular adviser conted. Requests to take the examination should be made to the curricular iser and the required fee paid at the Office of the Cashier before the date for the examination. See page 80 for more information.

RRICULUM REQUIREMENTS

hundred and twenty semester hours of course work are required for graduon. To be recommended by the Faculty for graduation, candidates are red to complete, in addition to the appropriate freshman and sophomore k, a minimum of 60 semester hours (second-group course work) in the ior and senior years selected from one of the two major field curricula red by the School.

Curriculum for the First Two Years in Accounting and Business Admi

FRESHMAN YEAR

Acct:	Acct 1–2
Econ:	Econ 1–2
Engl:	Engl 9 or 10, 11
Science:	BiSc 3–4 or 11–12; Chem 3–4 or 11–12; Geog 51 and 52 Geol 1–2; or Phys 1 and 2, 3 and 4, or 9–10
Elective:	Courses other than in accounting, business administration or economics
	Total

SOPHOMORE YEAR

BAd:	BAd 51
Humanities:	Art 31–32 or 71–72; Chin 3–4; Engl 51–52, 71–72, or 191–92; Fren 3–4 or 6, or 51–52; Germ 3–4 or 51–52; Ital 3–4; Mus 3 and 4; Slav 3–4, 5–6, or 91–92; Span 3–4 or 6, or 51–52; or SPDR 1 and 11 (Accounting majors may postpone this requirement until the junior year if they wish to take Acct 121 or 191 in the sophomore year)
Math:	Math 31 and 32, or 51 and 52
Social Studies:	Psyc 1, 8
	Anth 1–2, Hist 71–72, PSc 4 and 6 or 5 and 6, or Soc 1 and 2
Stat:	Stat 51
	Total

Accounting Major

JUNIOR YEAR

Acct 101:	Cost and Budgetary Control
†Acct 121:	Intermediate Accounting
Acct 161:	Federal Income Taxation
†Acct 191:	Advanced Accounting
BAd 102:	Fundamentals of Management
BAd 131:	Business Finance
BAd 141:	Basic Marketing Management
BAd 161:	Commercial Law
Mgt 118:	Introduction to Information Technology
Elective:	Selected from courses other than in accounting, business administration or economics
	Total

* Courses in Human Kinetics and Leisure Studies may not be taken for credit.
† If Acct 121 and 191 are elected in the sophomore year, students replace this requirement * semester hours of Humanities (see above).

SENIOR YEAR

Acct 132:	Accounting Theory	3
Acct 171:	Auditing	3
Acct 181:	Accounting Systems	3
BAd 101:	The Business Environment	3
BAd 181:	Manufacturing Production	3
BAd 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Stat:	Three semester hours selected from the following	3
Stat 111:	Business and Economic Statistics I	
Stat 155:	Introduction to Probability	
Stat 187:	Theory of Sampling	
Elective:	Three semester hours selected from courses in accounting*, business administration or economics, and three semester hours selected from courses in other departments	6
	Total	30

MAL SCHEDULE FOR ACCOUNTING COURSES

or Year: *Fall*—Acct 101, 121 (if not elected in sophomore year), 161; ng—Acct 191 (if not elected in sophomore year), 161 (if not elected in .

or Year: Fall—Acct 171; Spring—Acct 132, 181.

OUNTING PRACTICE INTERNSHIP

internship program, limited to selected senior Accounting majors, is avail- during the semester break of the senior year. To be admitted to this pro- l students must have the approval of the Chairman of the Department of ounting and must have completed at least 15 semester hours of Accounting ses (including a course in auditing) with a 2.85 or higher average and an -all grade of 2.5 by the end of the fall semester. Students will be paid a y while conducting audits under senior supervision of participating C.P.A. s. Other internships with industry and government are available. Students complete the internship successfully will register for Acct 199 the spring ester of their senior year and will receive 3 semester hours of credit. For ner information consult the chairman of the department of accounting.

ness Administration Major

program in Business Administration is designed to provide the broad dation required for eventual top leadership in either governmental or busi- administration. It consists of the 36 semester hours of *required* courses; 15 s" in one of the following group options; and 9 hours of electives, normally nced courses in liberal arts subjects.

dded students accepted in the Accounting Internship program will elect Acct 199 in place of ester hours of elective elected from courses in Accounting, Business Administration, or Economics.

JUNIOR YEAR

Acct 193:	Business Budgeting
BAd 102:	Fundamentals of Management
BAd 105:	Personnel Management
BAd 131:	Business Finance
BAd 141:	Basic Marketing Management
Mgt 118:	Introduction to Information Processing
Group Option:	Six semester hours selected from the chosen are specialization (see below)
Elective:	To be selected in consultation with the adviser
	Total

SENIOR YEAR

BAd 101:	The Business Environment
BAd 161:	Commercial Law
BAd 181:	Manufacturing Production
*BAd 198:	Business Policy and Administration
Econ 121:	Money and Banking
Psyc 144:	Personnel and Industrial Psychology
Group Option:	Nine semester hours selected from the chosen area specialization (see below)
Elective:	To be selected in consultation with the adviser
	Total

GROUP OPTIONS

Eight areas of specialization are open to Business Administration ma 15 hours taken in each of these options require the approval of the adv group option and the individual courses within the option should be se *the beginning of the junior year*. The student should contact the Cha the Department of Business Administration for assignment of an adviser

Group I: Economics

The following courses provide the basic academic foundation for such pos financial economic analyst, industrial economic analyst, and market research in business and government

BAd 132:	International Business Finance
BAd 133:	Capital Formation
BAd 176:	International Business Theory and Policy
Econ 101:	Intermediate Microeconomic Theory
Econ 102:	Intermediate Macroeconomic Theory
Econ 158:	Industrial Organization
Econ 161, 162:	Public Finance I, II
Econ 181, 82:	International Economics
Stat 111, 112:	Business and Economic Statistics I, II

* International Business majors must complete BAd 178 in lieu of BAd 198
† Required for this group option

II: Finance

llowing courses provide the basic academic foundation for such positions as nalyst, supervisor in a financial institution, bond cashier, trust officer, bank er, and similar positions in federal or international financial institutions.

*Acct 111: Financial Statement Analysis
Acct 121: Intermediate Accounting
BAd 113: Real Estate
BAd 121: Fundamentals of Insurance and Risk Management
BAd 122: Insurance and Estate Planning
BAd 132: International Business Finance
BAd 133: Capital Formation
*BAd 138: Investment and Portfolio Management
Econ 101: Intermediate Microeconomic Theory

p III: Information Processing

ollowing courses provide the basic academic foundation for positions in in- ion processing in government, business, and industry. They also give the t an understanding of the manager's use of information processing as a vital erial technique.

*Mgt 119: Computer Programming for Information Systems
*Mgt 120: Information Systems Development I
*Mgt 121: Information Systems Development II
*Mgt 122: Special Studies in Information Systems
dditional 3-semester-hour course approved by the adviser

p IV: International Business

ollowing courses provide the basic academic foundation for positions in inter- nal business, both in private industry and in government. Students in this n who have received credit for two years of a modern foreign language, or the alent, are required to take only 12 semester hours from the following courses.

*BAd 132: International Business Finance
*BAd 144: International Marketing Management
BAd 171: Principles of Transportation
*BAd 175: Introduction to International Business
BAd 176: International Business Theory and Policy
*BAd 178: International Business Policy and Operations
Econ 181–82: International Economics

p V: Marketing

following courses provide the basic academic foundation for such positions as manager, marketing manager, product development manager, research director, r, advertising director, sales promotion manager, and credit manager.

*BAd 143: Marketing Research
BAd 144: International Marketing Management
BAd 145: Sales Management
BAd 147: Advertising
BAd 158: Physical Distribution Management
BAd 171: Principles of Transportation
BAd 175: Introduction to International Business
BAd 178: International Business Policy and Operations

tured for this group option.

Jour 145:	Principles and Problems of Public Relations
Stat 111, 112:	Business and Economic Statistics I, II

Group VI: Personnel Management

The following courses provide the basic academic foundation for such p personnel manager, employee relations manager, and employment manag ness and government service.

*BAd 106:	Leadership in Personnel Management
*BAd 107:	Collective Bargaining
Jour 145:	Principles and Problems of Public Relations
Psyc 129:	Theories of Personality
Psyc 131:	Psychological Tests
SPDR 121:	Group Discussion and Conference Leadership

Group VII: Statistics

The following courses provide the basic academic foundation for such p financial statistician, planning statistician, industrial statistician, and rate business and government.

Stat 91:	Principles of Statistical Methods
*Stat 111, 112:	Business and Economic Statistics I, II
Stat 117:	Analysis of Variance
Stat 118:	Regression Analysis
Stat 155:	Introduction to Probability
Stat 157–58:	Introduction to Mathematical Statistics

Group VIII: Transportation and Logistics

The following courses provide the basic academic foundation for manage tions in transportation firms and in traffic departments of other types o firms and government agencies. The program should also aid in the prep the examinations for membership in the American Society of Traffic and tation.

BAd 158:	Physical Distribution Management
*BAd 171:	Principles of Transportation
BAd 172:	Public Utilities
*BAd 173:	Transportation Systems Management
BAd 174:	Urban Transportation
BAd 175:	Introduction to International Business
Geog 125:	Transportation Geography

The Master's D

Master of Business Administration.—The degree of Master of Bus ministration is this School's principal professional degree in busine designed to develop the analytical ability and perspective which will c to success as a responsible executive. Because of the increasingly close ship between government and business, the programs for this degree vide an excellent background for many government careers.

Master of Arts in Government.—The degree of Master of Arts in

* Required for this group option

ith an emphasis on Public Administration is for students who wish to rate on certain areas of administrative specialization. These areas in- rban problems, urban and regional planning, development administra- d research and development administration.

er of Public Administration.—The degree of Master of Public Ad- tion is primarily for those already in government service—federal, cal, intergovernmental, or international—or for those seeking manage- areers in government. The program provides students with an apprecia- the special requirements of public service, while at the same time them to improve their own analytical and decisional capabilities. The is interdepartmental in nature, but the major emphasis is in the Depart- f Public Administration. This degree, as well as the degree of Master in Government, meets the standards of the National Association of of Public Affairs and Administration.

er of Arts in Health Care Administration.—This professional degree gned to prepare students with interdisciplinary training for professional e in administration and planning roles in public and private health or- ions. Study in depth may be made in various aspects of Health Care istration found in short-term hospitals, long-term health facilities (such as ed-care institutions, nursing homes, mental hospitals, facilities for the group practice clinics, health information systems, and comprehensive planning agencies.

er of Urban and Regional Planning.—This professional planning degree gned as preparation for careers on the municipal, county, state, and na- levels in both public service and private consulting practice. The pro- of study is planned to provide a broad professional education, to de- competence in planning theory and methodology, and to emphasize the cal ability and creativity necessary for solving urban and regional ms.

er of Science in Administration.—The Master of Science in Administra- gree is offered only off campus. It provides a course of study appropriate se students currently working in government and business. It is a pro- al degree, preparing graduates for higher positions and greater respon- and generally improving their competence as administrators.

ANCE REQUIREMENTS

eligible for admission applicants must present the following minimum tials: a bachelor's degree from a regionally accredited college or uni- that includes at least 90 semester hours of academic work with an undergraduate quality-point index of 2.5 (on a 4.00 scale) and a score east the 50th percentile on the applicable admission test.

licants whose undergraduate quality-point index is less than 2.5 or whose ion test score ranks beneath the 50th percentile will be admitted if (1) ality-point index multiplied by 200 and added to the admission test equals 950 points, or (2) the upper division undergraduate (last two f undergraduate work) quality-point index multiplied by 200 and added admissions test score equals 1,000 points.

licants for admission to programs leading to the degree of Master of ss Administration must submit acceptable scores on the Graduate Man-

agement Admission Test: applicants for admission to programs lea
degrees of Master of Arts in Government, Master of Arts in H
Administration*, Master of Public Administration, and Master of
Regional Planning must submit scores on the Graduate Management
Test *or* the Graduate Record Examination. It is the responsibil
applicant to make arrangements for the required test with the
Testing Service, Princeton, N.J. 08540. Correspondence concerning
ate Management Admission Test should be addressed to Box 966;
the Graduate Record Examination, to Box 955.

Waiver of the admission test may be requested, by letter, by app
meet the following criteria: (1) the undergraduate quality-point in
3.00, (2) the undergraduate degree was conferred no more than
previously and (3) the undergraduate major was a discipline whic
the graduate program for which the application is made. The Admis
mittee will inform the applicant of whether or not the waiver will

GENERAL REQUIREMENTS

Extended programs, including undergraduate background courses
assigned for an applicant whose undergraduate degree was in a field
the graduate program the student wishes to follow, or whose und
record indicates a weakness in required background courses.

Master's degrees are awarded by vote of the Faculty on comple
required course work, an acceptable thesis (if one is elected or requi
equivalent work, and the passing of the Master's Comprehensive Ex

Second-group courses (numbered 101-200) may be counted towa
ter's degree only when registration for graduate credit has been appr
time of registration by the Dean and the curriculum adviser. No wo
toward a bachelor's degree may also be counted toward a master's

Full-time students are normally expected to register for 9 to 1
hours each semester. A graduate student who is employed more tha
a week may not take more than 6 semester hours. All work for a m
gree *must be completed in five years*, unless an extension of time is
the Dean. Continuous registration does not serve the purpose of e
student's degree candidacy beyond the five-year time limit.

A student who expects to continue studies for the degree of
Business Administration or Doctor of Public Administration after re
master's degree should ask for assistance in planning a program s
student may qualify for admission to candidacy for the doctorate.

No credit is granted for work done *in absentia* or without formal
except for hospital residency, supervised field experience, and the th
may be completed *in absentia* with the permission of the departme
lum adviser, or committee concerned.

Master's Comprehensive Examination

In addition to individual course examinations the candidate must pass

* Scores on the Miller Analogies Test are also accepted in place of the Graduate Ma
mission Test or the Graduate Record Examination for admission to the program
to the degrees of Master of Arts in Health Care Administration, Master of Arts in Go
Master of Public Administration. The Miller Analogies Test is offered through the
versities nationally.

Master's Comprehensive Examination. In writing the examination the
is expected to correlate what has been learned in coursework and
in the literature of the selected fields. The examination normally
from seven to nine hours writing time. Sections broadly cover the
fields which the candidate has selected for specialization.
Examinations are scheduled three times a year, in late November or
December, April and August, and should be taken during the last se-
of course registration or shortly after completion of the prescribed
work. The student must have completed or be registered for all core
ments before being eligible to take the examination. If there is a lapse
between completion of course work and the taking of the examination,
ent must maintain continuous registration and must be registered for
ester or summer session in which the examination is taken.
andidate should consult with an adviser, well in advance, as to the dates
xamination and the definition of the subject-matter fields which the ex-
on is to cover. A written application is filed with the department super-
he student's elective field of study no later than 30 days prior to the ex-
on date. Before applying for the examination, the student must have
ed all of the courses in the program or be enrolled in the last semester
st have achieved a 3.00 (*B*) average. After applying for the Exami-
a candidate may withdraw only by notice in writing to the Department
an.

ndidate who fails the examination may, with specific approval of the
repeat the examination, but only after the lapse of one semester and the
king of additional preparation as prescribed. *If the candidate fails a
time, no further opportunity to take the examination will be permitted.*

hip Requirements

for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*,
Incomplete; *W*, Authorized Withdrawal; and *CR*, Credit.
verage of *B* or better is required for the master's degree. The grade of *C*
onsidered as failing but must be counter-balanced by a grade of *A* in a
course of equal status.
dent whose quality-point index falls below 3.00 after completing a mini-
12 semester hours of graduate study will be placed on probation. This
n extends through the period in which the student next attempts 12
hours of graduate work, including prescribed courses. During this
he student's performance will be monitored to determine suitability for
ed graduate study. A student who is subject to probation for a second
utomatically suspended.
ster's degree candidate who receives a grade of *F* is required to present
or consideration by the Dean as to why continued study should be
d.

SION

ate student who does not meet the conditions of probation (see above)
suspended or asked to withdraw. A student who is suspended or with-
nder these conditions may apply for readmission after the lapse of one
. To be readmitted the student must submit evidence which indicates

academic success if readmitted. A student so readmitted will contin
demic probation and must achieve a minimum quality-point index
the next 12 semester hours of graduate study. Should the student fail
this minimum quality-point index a second suspension will result and
readmission will be denied.

INCOMPLETE / AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Author
drawal) may be assigned are described on page 46.

Removing an Incomplete.—The grade of *I* must be removed no
the last day of the examination period for the fall or spring semester in
following the semester or summer session in which the grade of *I* i
An "Incomplete" that is not removed within this period is automatical
to an *F*. In cases of well-documented extenuating circumstances, an
and a student may jointly petition the Dean, or the appropriate com
additional time in which to complete the work of the course. Such
should be submitted within the same period. The grade of *I* cannot be
by reregistering for the course here, or by taking its equivalent elsewhe

Required Courses in Administration (Certain Fields)

The following courses in general administrative theory and practice ar
of all candidates for the degree of Master of Business Administration
ter of Public Administration.

Mgt 201: Advanced Administrative Management
*Mgt 204: Quantitative Factors in Administration
Mgt 207: Human Behavior in Organizations

In addition, each student is normally required to take, from the
group, the course appropriate to the selected area of concentration:

Acct 276: Management Planning and Control
BAd 257: Business Policy in the Multinational Firm
BAd 297: Business Policy Formulation
HCA 206: Case Studies in Health Care Administration
Mgt 263: Case Studies and Field Research in GEMSOC
PAd 214: Policy Analysis in Public Administration, or
PAd 260: Policy Formulation and Administration

The Thesis

Students contemplating doctoral study are strongly urged to include th
as a part of their master's program. The thesis subject should be sele
early as possible so as to permit effective integration with the cours
The subject must be approved by the professor in charge of the studen
The thesis in its final form must have the approval of the professor in
and must be presented to the Dean by the student no later than the

* Mgt 204 is waived for students who select a concentration in Quantitative Analysis for
making.

in the calendar. Printed copies of detailed regulations regarding the
d reproduction of the thesis are available in the Office of the Dean.
nt of tuition for the thesis entitles the candidate, during the two semes-
egisters for thesis (299–300), to the advice and direction of the mem-
e Faculty under whom the thesis is to be written. In case a thesis is
d, an additional successive academic year is granted without further
ayment. The student must, however, maintain continuous registration
is period. If the preparation of the thesis extends more than three se-
eyond the date he registers for thesis 300, the student must register for
6 hours of thesis again and pay tuition as for a repeated course.

Master's Program Without a Thesis

is required in certain degree programs and optional in others. In those
where a thesis is optional and the student elects not to write one, the
nust take a course in research methodology and one other elective.

MASTER OF BUSINESS ADMINISTRATION

or the field of concentration in Accounting*, curricula leading to the
nal degree of Master of Business Administration include the following:

ecognized Common Body of Knowledge in business administration.
ay be fulfilled by waiver for prior work completed or by complet-
e courses listed below with a QPI of 3.00 or higher. A student with
lergraduate degree in business administration from an institution
ited by the American Assembly of Collegiate Schools of Business
rded as having completed the Common Body of Knowledge.

	Semester Hours
ommon Body of Knowledge Courses	
–2, or 115 and 193; BAd 131, 141, 161, and 181; Econ 1–2 or 3; Mgt 203; and Stat 51 or 111 or equivalent	30
ed Courses in Administration	
01, 204, and 207	9
olicy course, as appropriate, selected from BAd 257, 297; HCA 206; 263	3
of Concentration (see pages 158–62)	
semester hours of course work, planned and scheduled with the 's academic adviser	12
rch Requirement	
ts electing to write a thesis will complete the appropriate thesis (299-300); those not electing to write a thesis will complete one of propriate courses selected from BAd 295, Mgt 295, PAd 295, Acct ICA 207 or UR&P 295, plus one 3-semester-hour elective	6 0–6

nts must complete a minimum of 36 semester hours of graduate
ork. A maximum of one-quarter of the semester hours of graduate

urriculum leading to the degree of Master of Business Administration with a field of
in Accounting, see pages 211-12

coursework required for a degree may be approved for transfer to
of Government and Business Administration from the Division of
Students, another degree-granting division of this University or
credited college or university under the following conditions: the
must be approved as part of the student's program of studies, it mu
been applied to the completion of requirements for another degree,
graduate-level coursework, it must have been taken within the past
and the student must have received a grade of *B* or better. This a
be approved by a petition to the adviser and the Dean. A transcr
coursework must be on file before the petition can be considered.

Fields of Concentration

Students select a minimum of 12 semester hours from one of the
fields of concentration.

ACCOUNTING

This field is designed to provide a contemporary, broad-based academic
tion which will apply equally to the fields of accounting in govern
dustry, and public practice as well as to the field of general admi
employing accounting as an effective means of understanding the org
(See pages 211–12 for program of study.)

ADMINISTRATION OF SCIENCE AND TECHNOLOGY

This field explores the many aspects of technology relating to and in
research and development management, business, and public policy.
ployment of "state-of-the-art" technology and the creation of new te
through research and development are important processes in the ach
of the objectives of both private firms and governments.

The research and development environment has many unique op
characteristics. The program of graduate study in this concentration
designed to identify and study the problems associated with managing
professional people in a dynamic technology. As a contextual area,
gram stresses the need for students to undertake original and mean
search involving political, economic, sociological, and operational prob
countered by management in industrial, governmental, and military
and development organizations.

APPLIED ECONOMICS

This field covers economic institutions and analytical methods, from t
point of business or governmental management. Its purpose is to deve
a broad understanding of the tools of economics; (2) an analytical pe
respect to various facets of an organization's activity or multi-organ
areas of special interest; (3) a skill in problem-oriented applications of e
tools; (4) an ability to interpret historical development and predic
trends in firms, industries, and economies; (5) a familiarity with the
tional setting of economic activity; and (6) an appreciation of the e
reasoning behind public policies.

a strong orientation to the economic problems of organizations, this concentration is based on the methodology of general economics, which lements with the methods of management science.
lied economics presumes skills in quantitative methods, statistics, and diate-level general economics. It is offered in a sequence that com- with courses based on microeconomic and macroeconomic tools respec-

VIORAL SCIENCES IN ORGANIZATION DEVELOPMENT

curriculum program reflects the assumption that the effective utiliza- f the behavioral sciences is concerned with both means and ends; that ecialist in behavioral science not only is skilled in theory and research but pplies technical and specialized knowledge as a conscious force in ef- e organizational growth and improvement. Thus, courses are designed to the student with organizational concepts and behavioral skills appropriate imizing the utilization of a system's total resources.
is program is designed to fulfill the need for professionals capable of de- g, creating, and developing the necessary behavioral and organizational ns appropriate to rapidly changing societies. Emphasis is on the interrela- ips of such dimensions as motivation, leadership, problem-solving, organi- al growth, and increased complexity of modern organizations and their upon the functions of organizational development.

NESS-GOVERNMENT RELATIONS

field of concentration provides a knowledge and understanding of the total ess environment essential to business policy formulation and execution; a keener appreciation of the role and function of business in a free enter- society, its environmental needs for optimum effectiveness, and what gov- ent can and should contribute to that environment; familiarizes students successful techniques by which the content and direction of public policy d business can legally be influenced; and provides students with a thorough ledge of current government policies toward business, contemporary issues ing government-business relations, and possible solutions to problems in rea.
is field serves the needs of students of the business environment at the r's and doctoral levels and is based on the premise that the enormous in- ce of government on buiness and vice-versa—exercised in the roles of ator, customer, supplier, protector, and competitor—will become even pervasive and that business policy formulation and execution and business ion-making will become increasingly dependent upon thorough knowledge nderstanding of the total environment of business and, most importantly, vernment policies, programs, and laws affecting business.

NCE AND INVESTMENTS

field prepares students for careers in finance and investments, providing kground in business budgeting, controllership, treasury, long-range plan- reporting, and financial managament processes. Courses are designed to

emphasize the planning, analysis, implementation, and controls necessary
making effective financial decisions. Instruction not only applies to manu
turing and trading enterprise but, in addition, includes railroad and pu
utility financing. Each, however, has distinctive operating features. Most fi
cial dogmas have a universality that cuts across business lines, and varia
are more a matter of degree than a form of substantive difference.

GENERAL MANAGEMENT SYSTEMS AND ORGANIZATIONAL CYBERNETICS

This field addresses the critical need for management to deal effectively w
the fact that human institutions of all kinds tend to become larger and m
complex as changes accelerate both socially and technologically. In many
ditional academic fields general systems and cybernetic concepts have evo
as the interdisciplinary mode for understanding increasingly complex syste
This has profound relevance for the contemporary operating manager
policy-maker.

Because this program is essentially interdisciplinary and transcontextu
nature, the successful student is afforded an unusually broad range of op
tunities to apply educational experience to managerial, organizational
societal problems. Professional and academic career potentials are availabl
the following fields: (1) research and teaching in the growing number
systems and cybernetics oriented programs now emerging in colleges and
versities in the United States and elsewhere in the world; (2) institu
environmental interface management or consulting; (3) system-focused o
zation development consulting or staff work; (4) corporate and governm
agency long range (strategic) planning and control activities; and (5) advi
and staff positions and program directors in global agencies such as opera
components of the United Nations, multinational corporations and foundati
and multi-governmental agencies such as OECD, as well as in the agencies
departments of national governments.

HEALTH CARE ADMINISTRATION

This program of study consists of both on-campus academic studies an
campus field practice assignments. For further information see the descri
for the degree of Master of Arts in Health Care Administration on page

INFORMATION SYSTEMS TECHNOLOGY

This field is designed to provide a managerial understanding of the princi
of manual, mechanical, and electronic information processing, including c
puter programming concepts, methods, and languages; an appreciation of
capabilities, limitations, and selection procedure of information proces
equipment; a knowledge of all phases of management information systems
velopment, implementation, and evaluation; and an understanding of the
of both management and systems personnel in information technology. It
provides an appreciation of the role of information systems technology as a
of management.

Students actually participate in the development of management informa

ystems; in the selection of computer equipment; and in the installation, man-gement, and evaluation of management information systems—during class essions.

NTERNATIONAL BUSINESS

This field is designed to prepare students for careers in firms operating on a nultinational basis or about to enter the international field; for careers in the ederal government and in international agencies concerned with business, ndustry, and finance abroad; and for the Commerce option of the Foreign Service Officer Examination.

This program is also designed to provide foreign students with the back-ground and skills necessary to promote international business, and to prepare them for careers in foreign and domestic firms within their own countries and for commercial officer positions within their governments.

Each student's program is individually developed by the student's adviser ac-cording to the student's background and interests.

MARKETING

This field encompasses all phases of supply and demand, from procurement and materials handling to product presentation and distribution. A student may concentrate in several subfields: marketing research, sales management, adver-tising, retailing, and international marketing. In addition, study may be com-plemented with courses from fields such as anthropology, geography, jour-nalism, mathematics, psychology, sociology and others.

PERSONNEL MANAGEMENT

This field is concerned with all aspects of the employment of human resources in business organizations. Career opportunities are open in domestic and international business organizations, hospitals, trade associations, research and educational institutions and local, state and federal government agencies. Courses encompass all phases of the recruitment, selection, employment, and develop-ment of people, industrial relations, unionism, collective bargaining, labor relations and manpower utilization.

PROCUREMENT AND CONTRACTING

This field responds to the recognized need for greater professionalism and sophistication among those engaged in procurement activities of the federal government and in contracting activities of vendors to the federal government.

The sustained increase in federal purchasing—in volume, variety, and com-plexity—places ever greater demands upon the skill and resourcefulness of pro-curement and contracting personnel. The field has therefore been designed with the following objectives: (1) to provide a broad professional education in the knowledge and skills necessary for success in this field; (2) to develop in the student increased ability in analysis, decision-making, and communications; (3) to increase the student's appreciation of the economic, social, legal and tech-nological considerations present in procurement and contracting activity.

QUANTITATIVE ANALYSIS FOR DECISION-MAKING

This field develops a thorough understanding of quantitative or mat approaches to problems of managerial control and decision-making. program will develop a competent background in basic mathematic associated with the various techniques, it is oriented toward applicati techniques rather than their theoretical mathematical content.

TRANSPORTATION

This field is concerned with both private and public planning and management of a viable transport system which will best serve the ne nation and its industries within a competitive framework. Transporta integral function of all levels of government, as well as of every unit o throughout the nation.

MASTER'S DEGREES IN PUBLIC ADMINISTRATION

The School of Government and Business Administration offers two programs in public administration: the Master of Public Admi (M.P.A.) and the Master of Arts in Government (M.A. in Govt.). degrees have identical entrance requirements. Degree requirements programs include a minimum of 36 semester hours of which at least must be taken in the Department of Public Administration.

A maximum of one-quarter of the semester hours of graduate cou required for a degree may be approved for transfer to the School of ment and Business Administration from the Division of University another degree-granting division of this University or another a college or university under the following conditions: the coursework approved as part of the student's program of studies, it must not b applied to the completion of requirements for another degree. it graduate-level coursework, it must have been taken within the past and the student must have received a grade of *B* or better. This action approved by a petition to the adviser and the Dean. A transcri coursework must be on file before the petition can be considered.

Both the M.P.A. and M.A. in Govt. programs require that the stu cessfully complete PAd 295 *Research Methods* (three semester hou four core courses (12 semester hours) which constitute a Common Knowledge in public administration. These courses deal with the subject areas: the study and practice of public administration, public ture analysis, public policy, and organization theory. In each of the areas, students are to choose one of two courses either of which fill curriculum requirement. The Common Body of Knowledge encomp these courses is the basis of one of the two comprehensive examinatio at the completion of the students' formal coursework.

The difference between the two degrees is indicated by the major field the student will take and which will also be the second of the two hensive examinations. The M.P.A., with its emphasis on management, re three-course management science core. By contrast, the M.A. in Govt requires specialization in one of 12 subject area options. These are d in greater detail below.

ster of Public Administration and Master of Arts in Government degree
lates who do not have strong undergraduate backgrounds in public ad-
ration or political science, or who lack extensive experience in govern-
service, are strongly urged to take one of three courses dealing with
can administrative institutions: PAd 213 *Administration in the Federal*
nment, PAd 245 *Intergovernmental Relations* or PAd 250 *Administra-*
f State and Local Governments.
remainder of the 36 hour program consists of three or four elective
s chosen by the student with the adviser's approval. These electives may
tside the student's area of concentration. Students may also elect to
a master's thesis which would be counted as two elective courses (six
.

ause the public service requires a wide variety of expertise, students with
dergraduate degree backgrounds are considered for admission. There are
requisites.

s Required for Both Public Administration Master's Programs

295 Research Methods (3 hours)

C ADMINISTRATION CORE (12 hours)

210 Concepts and Issues in Public Administration
252 Public Expenditure Analysis and Planning
214 Policy Analysis in Public Administration
or
260 Policy Formulation and Administration
221 Organization Theory and the Public Sector
or
223 Behavioral Factors in Large Organizations

CAN ADMINISTRATIVE INSTITUTIONS (3 hours), select one of the
ng:

213 Administration in the Federal Government
245 Intergovernmental Relations
250 Administration of State and Local Governments

VES

or four courses (9-12 hours)

of Public Administration Degree

P.A. degree is primarily directed toward students who wish to obtain
al working knowledge of management and administration. Students who
pursue careers encompassing a broad array of management activities,
are currently engaged in such careers, are encouraged to select the
degree regardless of the governmental level (federal, state or local)
h they intend to work.
course requirements for the M.P.A. in addition to those described

earlier, include the three-course management core entitled "Adm
Theory and Practice." These three courses, consisting of nine semes
include the following:

Mgt 201 Advanced Administrative Management
Mgt 204 Quantitative Factors in Administration
Mgt 207 Human Behavior in Organizations

Master of Arts in Government Degree

The M.A. in Govt. degree is recommended for students who wish to s
in an area of administration important to the performance of speciali
functions in the public service or relevant to a particular governmental
activity, such as urban administration. This contrasts with the general
ment background provided by the Administrative Theory and Practi
centration required for the M.P.A. The M.A. in Govt. allows the stu
consultation with an adviser, to select one of 13 areas of concentratio
below. The area constitutes the basis for the student's second compre
examination (in addition to the public administration core required f
degrees). Specific areas of concentration require either three or four
(9 to 12 hours) as noted below:

Behavioral Science (9 hours)
Budgeting and Finance (9 hours)
Business-Government Relations (9 hours)
Development Administration (9 hours)
Health Care Administration (12 hours)
Information Technology and Systems Management (9 hours)
International Management (9 hours)
Manpower Management (12 hours)
Policy Analysis and Evaluation (9 hours)
Public Personnel Administration (9 hours)
Research and Development Administration (9 hours)
Urban Administration (12 hours)
Urban and Regional Planning (9 hours)

In choosing elective courses necessary to complete the 36-hour degr
quirement, M.A. in Govt. candidates may consider any or all of the c
required for the Administrative Theory and Practice core or other fie
specialization available under the M.A. in Govt. program. Although e
courses *may* often constitute an informal area of specialization, they a
subject to comprehensive examination in either degree program.

MASTER OF URBAN AND REGIONAL PLANN

The program of graduate study in Urban and Regional Planning leads
professional planning degree of Master of Urban and Regional Planning
designed as preparation for careers on the municipal, county, state, and n
levels, and for private professional practice. The course of study is desig
provide a broad professional education, to develop competence in pl
theory and methodology, and to emphasize the analytical ability and cre
necessary for solving urban and regional problems. Each student's prog

ned in consultation with an assigned faculty adviser in accordance with
dual career plans.
degree is awarded by vote of the Faculty after satisfactory completion of
om 45 to 50 semester hours of course work, depending upon the back-
l and experience of each individual student, including a thesis equivalent
emester hours (most students will ordinarily be required to take 50 semes-
urs); (2) a minimum of three months' full-time professional training in a
ing agency under qualified supervision, with an acceptable written report
submitted after completion of the training period; (3) a written Master's
prehensive Examination; and (4) a thesis based on the candidate's re-
h in the field of urban and regional planning.

MASTER OF ARTS IN HEALTH CARE ADMINISTRATION

program of study leading to the degree of Master of Arts in Health Care
inistration consists of a basic minimum two-year period of graduate study,
ally including both on-campus academic studies and off-campus field prac-
assignments. The length of each period is dependent upon the study-in-
concentration, which the student elects. The majority of students begin
studies in the fall semester of each year. However, a limited number of
fied students may be admitted to begin their course work in the spring
ster and summer sessions. The basic curriculum is developed in keeping
the background and professional goals of each student and ordinarily
sts of a minimum of 48 semester hours. Undergraduate courses in ac-
ting, economics, and statistics are required as a prerequisite for all of
oncentrations in this program.
dinarily full-time students can expect to complete the on-campus phase of
egree program in two to three semesters, and the administrative residency
ld practice in one to two calendar years. The total time depends on past
mic course work and experience in the health care field.
dents will select one of the following concentrations: Administration of
-term Care Facilities, Comprehensive Health Planning, Health Information
ms or Hospital Administration.

nistration of Long-Term Care Facilities

concentration is designed to prepare students for administration in such
as nursing homes, facilities for the aged, mental hospitals and community
clinics.
ring the first phase the student must complete a satisfactory academic pro-
of course work, selected in accordance with the student's background and
. These courses cover the general technical background of health care ad-
tration, general administrative theory and practice, and problem-solving in
anagement of extended care and long-term care patients.
e second phase is a period of field experience as an administrative resident
a qualified preceptor. A written major report or selected field project
ts are required.

Comprehensive Health Planning

This concentration is designed to prepare students to plan for and co
all aspects of private and public health care systems in accordance wi
management principles. It is an interdisciplinary program which
courses from (1) health care administration; (2) health care planni
supporting disciplines such as sociology, urban and regional planning, q
tive methods, public administration; and (4) a particular area of conce
selected by the student to gain a specific skill.

In addition to the course work there are periods of supervised field
ence. Written reports are required.

Health Information Systems

This concentration recognizes the rapidly growing demand for individua
can develop and implement the use of computer-based information syst
decision-making approaches. It is designed to prepare those who wish to
vise and coordinate data collection, processing, and retrieval activities for
care complexes.

During the first phase the student must complete a satisfactory ac
program of course work, selected in accordance with the student's back
and needs. These courses cover the general and technical background of
care administration and general administrative theory and practice. In a
students must complete required courses in computer services and inform
handling.

The second phase consists of supervised field experience, which in
written reports.

Hospital Administration

This concentration is divided into two phases. During the first phase the s
must complete a satisfactory academic program of course work, selecte
accordance with the student's background and needs. These courses cov
general and technical background of health care administration, genera
ministrative theory and practice and problem-solving in management as
lates to short-term care hospitals.

The second phase is a period of field experience as an administrative
dent under a qualified preceptor. A written major report or selected
project reports are required.

Post-Master's Graduate Certific
in Health Care Administrat

STUDENTS WITH APPROVED MASTER'S DEGREES from accredited institutions
take a special post-master's program leading to a Post-Master's Graduate C
tificate in Health Care Administration. Each program will be planned to
the professional needs of the individual student, whether the student wishes
undertake a new field of study or to amplify knowledge of work done at
master's level.

program permits study in depth of such areas as health care administra-
nsulting; comprehensive health planning; government health care admin-
n at federal, state and county levels; long-term care administration, in-
g mental hospitals, nursing homes and facilities for the aged; and health
dministration research.

equisite: a master's degree from an accredited college or university and
ademic average which indicates the ability to undertake advanced study.
pplicant is also judged on experience, character and personality. Ap-
ts lacking formal study in health care administration are required to take
ying courses.

IREMENTS FOR THE CERTIFICATE

students with adequate preparation in the health care field should be
to complete the requirements by taking a program of study with a mini-
of 30 semester hours of coursework. Those lacking such specialized
will need more. At the discretion of the student's advisory committee a
mum of six semester hours may be transferred from another accredited
ution if the work was taken for credit toward a graduate degree.

GRAM OF STUDIES

270 *Research in Health Care Administration*, HCA 285–86 *Readings in*
h Care Administration and HCA 288 *Seminar: Field Problem Studies in*
h Care Administration are required of all candidates for the Certificate.
remaining courses consist of a program of study worked out in consul-
with a faculty adviser and planned with consideration of the student's
ience and educational background and specific professional objectives.

ctoral Study

K FOR THE DEGREES of Doctor of Business Administration and Doctor of
c Administration is supervised by the Committee on Doctoral Studies.

MISSION

pleted application forms must be sent to the Office of the Admissions Offi-
School of Government and Business Administration, George Washing-
University, Washington, D.C. 20052. The applicant should ask three indi-
ls, who are acquainted with the applicant's ability to do high-level aca-
c work, to write directly to the Chairman of the Committee on Doctoral
es. These letters of reference should be on special forms which will be
ded by the Committee Chairman. Applicants for the degree of Doctor of

Business Administration must file results of the Graduate Managemen
sion Test with the Office of the Admissions Officer before final app
their applications can be given. Applicants to the doctoral program
mally expected to take either the Graduate Record Examination
Graduate Management Admission Test. However, applicants who ha
the Law School Admission Test or the Medical College Admission T
submit these test scores for consideration. Under special circumsta
Miller Analogies Test may also be submitted. Applicants whose tes
are more than 10 years old are encouraged, but not required, to take o
the Graduate Record Examination or the Graduate Management Ad
Test. Arrangements to take these tests must be made with the Educ
Testing Service, 20 Nassau St., Princeton, N.J. 08540, or 1947 Ce
Berkeley, Calif. 94704.

An applicant must have a degree of Master of Business Administra
Master of Public Administration, as appropriate; or a Master of Arts d
an approved field; or the equivalent, together with acceptable personal q
and a capacity for creative scholarship.

QUALIFYING EXAMINATIONS

Qualifying examinations are normally given in two areas: accountin
quantitative methods (in the case of accounting, examinations are given
public administration and in the business administration contexts). Ex
unusual circumstances, these tool examinations will be taken during th
year of course work. Computer programming or a foreign language (
appropriate) can be substituted for accounting.

Doctoral students may have the opportunity to retake a failed tool ex
tion only one time without petition. Unless subsequently approved by pe
a second failure on a tool examination will constitute grounds for dismi

Accounting Option (D.B.A.).—If the following courses are taken an
pleted with a minimum grade of B in each course, the accounting tool e
nation will be waived: Acct 115, 215 and one course selected from Acct
275, 276, 282, 295. If the student has previously successfully completed
ductory accounting at the college level, Acct 115 (which is a prerequis
Acct 215) will not be required.

Accounting Option (D.P.A.).—This option will be considered on an
vidual basis. All interested D.P.A. degree candidates should contact the
counting Department Chairman for guidance.

Quantitative Methods Option (D.B.A. and D.P.A.).—If the follo
courses are taken and completed with a minimum grade of B in each co
the tool examination for quantitative methods will be waived: Mgt 20
and 226. If the student has previously successfully completed a cours
calculus at the college level during the preceding five years, Mgt 203 (
is a prerequisite to Mgt 225) will not be required.

PLAN OF STUDY

The fields of (1) Administrative Theory and Practice and (2) App

Economics are required for the Doctor of Business Administration degree; the fields of (1) Administrative Theory and Practice and (2) American Political Process and Public Administration are required for the Doctor of Public Administration degree. The Chairman of the Committee on Doctoral Studies, in consultation with the applicant, will designate two elective fields of study and will appoint an adviser to guide the student in work in each of the fields undertaken. Elective fields may be chosen from such areas as Accounting, Administration in Urban Areas, Applied Economics, Behavioral Sciences in Organization Development, Comparative and Developmental Administration, Finance and Investments, General Management Systems and Organizational Cybernetics, Government-Business Relations, Health Care Administration, Information Systems Technology, International Business Administration, Management of Science and Technology, Marketing, Personnel Management, Production and Procurement, Public Financial Management and Budgeting, Public Personnel Management, Public Policy Analysis, Quantitative Analysis for Decision-making and Urban and Regional Planning. Most students will complete, prior to the General Examination, a minimum of 30 semester hours in graduate courses and such additional course work as may be prescribed by the adviser; but, the exact content of each program is determined in light of the student's background and competence after consultation with the appropriate faculty member in each of the fields undertaken.

Full-time students are normally expected to register for 9 to 12 semester hours each semester. All work for the doctor's degree must be completed in five years unless an extension of time is granted by the Committee on Doctoral Studies prior to the expiration of the time limit. All course work must be taken on campus.

When the applicant has completed all course work and has satisfied the adviser and the Committee of readiness to take the General Examination in the fields of study previously designated, the examination will be scheduled during the following February or October.

Upon successful completion of the General Examination and approval of the subject of the doctoral dissertation, the student may be admitted to candidacy by the Committee on Doctoral Studies. The candidate's research and the preparation of the dissertation are supervised by a Research Adviser designated by the Committee.

After admission to candidacy, the student must register for 24 hours of *Dissertation Research* (399). Full-time students must register for nine to 12 hours a semester for two semesters, and for sufficient hours in the third semester to complete the 24-hour requirement. Part-time students must register for six semester hours a semester for four semesters. If the dissertation has not been completed during the time the student has registered for the required 24 hours, the student must register for three semester hours of *Dissertation Research* (399) each succeeding semester until the satisfactory completion of the dissertation and the final oral examination.

Between 1974 and 1977, the School is conducting an experimental doctoral program. A small, carefully selected group of students will be permitted to meet doctoral requirements by alternative methods under the guidance of a faculty adviser and with the approval of the Committee on Doctoral Studies. Students wishing to be considered for inclusion in this experimental program should indicate this on their applications.

The Dissertation

A dissertation is required as evidence of ability to perform scholarly resea and to interpret and present its results.

No later than the date specified in the Calendar the candidate must submi the Dean three complete copies of the dissertation and an original copy o abstract of the dissertation for inclusion in the Announcement of the Final amination and for reproduction by University Microfilms, Inc.

Printed copies of detailed regulations regarding the form and reproduction the dissertation, preparation of the abstract, and services offered by Univer Microfilms, Inc., are available in the Office of the Committee on Docto Studies. The successful candidate for the doctorate is required, before recei the degree, to pay a fee to cover the expense of printing the abstract of dissertation, and for the basic service rendered by University Microfilms, I (see page 30).

The Final Examination

The Final Examination of the candidate consists of an oral defense of the sertation and is given by a committee appointed by the Committee on Docto Studies. Upon successful completion of this oral examination the candidate be approved for the degree of Doctor of Business Administration or Doctor Public Administration by the Committee on Doctoral Studies.

RESIDENCE

The Committee on Doctoral Studies expects all students to remain registe until *all* degree requirements are satisfied. The student who undertakes eith part of the doctoral program on a full or limited schedule must maint "continuous registration" under the School of Government and Business A ministration even when granted a leave of absence for study or residence el where. By failing to register for one semester or more, the student brea registration and must apply for readmission to the School under whatever n conditions and regulations are set up by the Committee or the member of t Faculty who directs the student's research. The student who has complet tuition requirements, but whose graduation is deferred for any reason, mu maintain continuous registration by paying the continuous registration fee f the semester immediately preceding the graduation at which the degree expected to be granted.

Special Programs

GOVERNMENT INTERN SCHOLARSHIP PROGRAM

The Government Intern Scholarship Program offers annually 50 scholarship to assist government agencies in training carefully selected young men and women for administrative leadership in government career service. Each

cholarship provides a tuition-free course of three semester hours a semester, nd interns who maintain satisfactory standing in both their academic program nd their government training program may qualify for a second scholarship or one additional semester.

NAVY GRADUATE FINANCIAL MANAGEMENT PROGRAM

The Navy Graduate Financial Management Program, sponsored by the Naval Postgraduate School, provides 45 semester hours of work in financial management and related fields for a selected group of Naval and Marine officers. The Master of Business Administration degree is awarded upon successful completion of this full-year program.

CONTINUING EDUCATION IN HEALTH CARE ADMINISTRATION

A nondegree program is conducted in the various areas of health care administration both on campus and off campus whenever a sufficiently large class is organized. Institutes, workshops, and lecture series are conducted under the auspices of program faculty and selected leaders from local, state, and regional areas on topics of current interest to the requesting organization. There is no specific prerequisite. Fees are to be announced.

INTERNATIONAL INSTITUTE FOR HEALTH CARE ADMINISTRATION

In recognition of special educational needs of students from other countries, The International Institute for Health Care Administration offers programs of instruction designed to meet these needs at either the degree or certificate level. It is also equipped to enter into arrangements with principles of hospital systems in world-wide areas to assist in the preparation of teaching programs or the actual instruction of administrative personnel either abroad or at the University.

COMBINED MASTER'S AND JURIS DOCTOR DEGREE PROGRAM

In certain instances arrangements may be made for students to work concurrently toward both the Juris Doctor degree in the National Law Center and a master's degree in some fields in the School of Government and Business Administration. Students must be admitted both to the National Law Center and, separately, to the School of Government and Business Administration and must meet all requirements in each degree program. It is possible for a student to complete work for both degree programs within four years.

CERTIFICATION OF PUBLIC PURCHASING AGENTS

The School of Government and Business Administration participates in the Na-

tional Institute of Governmental Purchasing professional certification program. Courses and examinations leading to qualification as "Certified Public Purchasing Officer" (CPPO) are provided. Inquiries may be directed to the School or to the National Institute of Governmental Purchasing, 1001 Connecticut Avenue, N.W., Washington, D.C. 20036.

BACHELOR OF SCIENCE IN HEALTH CARE ADMINISTRATION

A program of study leading to the degree of Bachelor of Science in Health Care Administration develops persons for beginning administrative and planning level positions in hospitals and related health organizations. At this time the degree program is limited to students in the Naval School of Hospital Administration in Bethesda, Md.

OFF-CAMPUS DEGREE PROGRAMS

The School of Government and Business Administration has academic jurisdiction over off-campus programs leading to the following degrees: Bachelor of Science in Administration with concentrations in accounting and business administration and the Master of Science in Administration.

These degree programs are administered by the College of General Studies. For details concerning the off-campus programs see the *College of General Studies Catalogue*.

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

Dean B.M. Sapin

FACULTY*

Professors J. Aschheim, R.H. Davison, M. Gordon, A. Gyorgy, P.P. Hill, H.C. Hinton, C. Hsieh, J.W. Kendrick, H.L. LeBlanc, R.K. Lewis, F.H. Michael, J.A. Morgan, Jr., J.N. Mosél, B. Nimer, V. Petrov, H. Pollack (*Research*), B. Reich, J.W. Robb, H.M. Sachar, B.M. Sapin, R.P. Sharkey, C. Shih, G. Sigur, H. Solomon, G. Stambuk, C.T. Stewart, Jr., R.B. Thompson, R. Thornton, H.B. Yakobson

Adjunct Professors T.F. Carroll, A. Halpern

Associate Professors R.M. Dunn, Jr., C.F. Elliott, W.R. Johnson, Y. Kim, P.F. Klarén, C.A. Linden, J.M. Logsdon, J.C. Lowe, J.K. McDonald, C.A. Moser, H.R. Nau, S.J. Wayne, R.Y. Yin

Adjunct Associate Professors D. Robinson, R.A. Young

Assistant Professors C.M. Aho, S.W. Burks, R.L. Cole, J.J. Cordes, R.E. Darcy, D. Fischer, S.A. Grant, K.J. Langran, D.L. Lee, G.C. MacKenzie, E.O. Pederson, L.P. Ribuffo, S. Shaffer, J.M. Starrels, F. Thoumi, G.C.Y. Wang, A.M. Yezer

Instructor C. McClintock

COMMITTEES†

DEAN'S COUNCIL

R.L. Cole, R.M. Dunn, Jr., C.F. Elliott, M. Gordon, P.P. Hill, H.C. Hinton, W.R. Johnson, J.M. Logsdon, J.K. McDonald, H.R. Nau, V. Petrov, S. Shaffer, G. Stambuk, R. Thornton

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* The President of the University, the Vice President for Academic Affairs, the Registrar of the University, the Director of Admissions of the University, and the University Librarian are ex officio members of the Faculty of the School of Public and International Affairs.

† The Dean of the School is an ex officio member of all committees.

COMMITTEE ON PROGRAMS AND CURRICULUM

R.E. Darcy, R.H. Davison, R.M. Dunn, A. Gyorgy, H.C. Hinton, Y. Kim J.M. Logsdon, B. Nimer, R. Thornton

COMMITTEE ON ADMISSION AND ADVANCED STANDING

S.W. Burks, M. Gordon, W.R. Johnson, C.A. Linden, J.M. Logsdon, A.M Yezer

COMMITTEE ON EAST ASIAN STUDIES

W.R. Johnson (*Chairman*), H.C. Hinton, F.H. Michael, C. Shih, G. Sigur R. Thornton, R.Y. Yin

COMMITTEE ON RUSSIAN STUDIES

C.A. Linden (*Chairman*), C.F. Elliott, S.A. Grant, A. Gyorgy, G.A. Olkhovsky V. Petrov, R.B. Thompson, R. Thornton, H.B. Yakobson

COMMITTEE ON WORK-STUDY AND INTERNSHIP PROGRAMS

R.L. Cole, D. Fischer, K.J. Langran, J.A. Morgan, V. Petrov, J.M. Starrels

INTRODUCTIO

With the establishment, in 1898, of the School of Comparative Jurisprude and Diplomacy, the study of Government was first organized as a separa entity in the University. In 1928, this School was reorganized and broade as the School of Government. During the next two decades, program business administration and public administration were added, and the emphas gradually shifted from undergraduate to graduate study. The name was chang in 1960 to the School of Government, Business, and International Affairs reflect more accurately the offerings of the School. A division of the Sc was effected in 1966, and two schools were established – the School of Gov ment and Business Administration, a primarily professionally oriented scho and the School of Public and International Affairs, a primarily policy-orient school.

Programs of the School of Public and International Affairs are interdisci nary, and emphasize governmental policy, both domestic and foreign.

Students in the freshman and sophomore years are registered in Columbi College of Arts and Sciences, the liberal arts college of the University, and a assigned special advisers from the School of Public and International Affai to assist them in planning their programs.

Academic Programs

Programs available within the School of Public and International Affairs are undergraduate fields in Chinese Language and Literature, East Asian Studies (China and Japan) and Urban Affairs; undergraduate and graduate fields in International Affairs and Public Affairs; and graduate fields in Latin American Studies, Russian Studies, and Science, Technology and Public Policy. Special programs in Soviet, Far Eastern and East European studies are offered by the School's Institute for Sino-Soviet Studies.

Objectives

Four undergraduate programs of study—East Asian Studies, International Affairs, Public Affairs and Urban Affairs—are aimed at preparing the student to understand major contemporary issues in international affairs or in domestic public affairs. The programs are designed not to produce narrow professional specialists, but to foster a liberal education, interdisciplinary in nature and broader than a concentration in one of the conventional disciplines. In each program there is double effort: to develop a background as broad and as deep as possible in order to assist in the understanding and analysis of modern problems, and to give instruction in some useful tools of analysis. The program in Chinese Language and Literature is closer to the traditional liberal arts pattern, emphasizing language and culture.

The graduate programs leading to the degree of Master of Arts are more concentrated. The student is expected to develop a greater competence in an area or a discipline, building on the student's undergraduate program in preparation for professional employment in government, in international organizations, in business or in private agencies concerned with public or international affairs.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *are stated on pages 21–34; other University regulations, on pages 45–52.*

Attendance

A student may not attend classes until registration is completed and fees due are paid.

The student is held responsible for all the work of the courses in which registered, and all absences must be excused by the instructor in charge before provision is made to make up the work missed.

A student suspended for any cause may not attend classes during the period of suspension.

Withdrawal

Withdrawal after the end of the fifth week of classes (fall or spring semester) without academic penalty is permitted only in exceptional cases (see "Withdrawal," page 47).

The Degree of Bachelor of Arts

THE SCHOOL OFFERS PROGRAMS leading to the degree of Bachelor of Arts fields of Chinese Language and Literature, East Asian Studies (Chin Japan), International Affairs, Public Affairs and Urban Affairs.

ENTRANCE REQUIREMENTS

The satisfactory completion of the *Chinese Language and Literature, East Studies and International Affairs, Public Affairs,* or *Urban Affairs* curric in Columbian College of Arts and Sciences (see pages 83–85), or the eq lent, is required.

GENERAL REQUIREMENTS FOR THE DEG

The following requirements apply to both the standard 120-semester-hour the special 90-semester-hour programs. See page 179 for additional requ ments for the 90-semester-hour program.

Academic Work Load

Normal academic work load for the full-time student is 15 semester hours student with a strong academic record may take up to 18 semester hours w the approval of the Dean.

Scholarship Requirements

In order to graduate, a student must have the following: (1) 120 semes hours (or 90 semester hours if the student qualifies for the special 90-semes hour program) of passing grades (courses in Human Kinetics and Le Studies cannot be included in the required hours); and (2) grades of *A* *B* in four 3-semester-hour courses in the major, to be taken in residence George Washington University. The major includes the required second-g courses (101-200) and courses taken in the group options.

DEAN'S HONOR LIST

The name of every student who attains a 3.5 quality-point index* in cours work is placed on the Dean's Honor List for that semester. Appearance on t List will be limited to (1) full-time students registered for a minimum of 1 semester hours and (2) part-time students registered for a minimum of 1 semester hours over a period of two consecutive semesters, which may includ a summer term.

*See pages 46–47 for explanation of the quality-point index.

EMIC STANDING

dent who is not suspended or on probation is considered to be in good ing.

e rules below govern probation and suspension and are applicable as d to students enrolled for a full-time program (12 semester hours or more) g the fall or spring semester or the three summer sessions. For students g less than 12 semester hours in any one semester or summer session, e rules are applied on the basis of 12 or more hours taken during two or e semesters or summer sessions.

BATION

tudent who in one semester receives two grades of *F** in courses carrying e or more semester hours of credit each, or the equivalent, is placed on pro- on. A student on probation who receives one grade of *F** in such a course be continued on probation for a second semester. A student on probation ng 12 or more semester hours whose grades are all *C* or better is removed m probation.

SPENSION

student who in one semester receives grades of *F** in three courses carrying ee or more semester hours of credit each, or the equivalent, is suspended. A dent on probation who receives two or more grades of *F** in such courses is spended. A student who receives one or more grades of *F** in such courses a second semester on probation is suspended.

A student who is suspended for poor scholarship may apply for readmission ter the lapse of one fall or spring semester. To be considered for readmission, e student must pass prescribed tests and submit evidence to the Dean's ouncil of conduct during absence from the University which indicates that the dent will profit from readmission. A student readmitted after suspension is probation. In no case will the probationary period after readmission exceed hours of study. A student suspended twice for poor scholarship will not be admitted.

COMPLETE AUTHORIZED WITHDRAWAL

nditions under which the grades of *I* (Incomplete) or *W* (Authorized With- awal) may be assigned are described on page 46.

Removing an Incomplete.—The grade of *I* must be removed no later than the st day of the examination period for the fall or spring semester immediately llowing the semester or summer session in which the grade of *I* is assigned. n "Incomplete" that is not removed within this period is automatically changed

In determining whether a student is placed on probation or suspension two grades of *D* are equated to one grade of *F*. Thus, for example, a student who receives one grade of *F* and two grades of *D* is placed on probation, and a student who receives two grades of *F* and two grades of *D* is suspended.

to an *F*. In cases of well-documented extenuating circumstances, an instru and a student may jointly petition the Dean, or the appropriate committee additional time in which to complete the work of the course. Such pet should be submitted within the same period. The grade of *I* cannot be rem by reregistering for the course here or by taking its equivalent elsewhere

Residence

A minimum of 30 semester hours, including at least 12 hours in the majo must be completed while registered in the School of Public and Interna Affairs. This requirement applies to students transferring within the Univ as well as to students transferring from other institutions. Unless specia mission is granted by the Dean to pursue work elsewhere, the work o senior or final year must be completed in the School of Public and Interna Affairs.

Use of Correct English

Any student whose written or spoken English in any course is unsatisfa may be reported by the instructor to the Dean. The Dean may assign s mentary work, without academic credit, varying in amount with the nee the student. If the work prescribed is equivalent to a course, the regular t fee is charged. The granting of a degree may be delayed for failure to rem any such deficiency in English to the satisfaction of the Dean.

Study Abroad

Students wishing to study abroad must consult with their advisers and the D because arrangements must be made on an individual basis. Students s receive the Dean's approval, in advance, for their plan of study abroad if plan to have the credits earned abroad apply to the degree program the registered for in this School. A catalogue or other description of the institution or study program should be presented for consideration together detailed descriptions of the courses to be taken. Students of interna affairs are encouraged to travel and study abroad.

Credit/No Credit Option

A student in the School of Public and International Affairs who has a cu tive quality-point index* of 2.5 or better may, with the approval of the ad and the Dean, take one course each semester and receive a grade of *CR* C or *NC*, No Credit, which will be recorded on the student's transcript but w be reflected in the cumulative grade average. A student must sign up for an option at registration. Under no circumstances may a student change credit/no credit status to graded status, or vice versa, after the end of re tion. Courses in the student's major (except those in which the grade of *NC* is normally assigned) may not be taken on a credit no credit bas transfer student may not elect to take a course on a credit no credit bas the second semester of enrollment in the University. Students in the Sc of Public and International Affairs may take no more than six courses in w the grade of *CR* or *NC* is assigned, including those in which the grade of

* See pages 46-47 for explanation of the quality-point index

is normally given and those taken in any other college, school, or division
he University prior to transferring to the School of Public and International
airs.

respondence and Home-Study Courses

dit for correspondence or home-study courses is not acceptable and cannot
pplied toward a degree.

litional Requirements for the 90-Semester-Hour Program

eptional students may, when registered as freshmen or sophomores in
mbian College of Arts and Sciences, petition the Dean of the School of
lic and International Affairs for admission to a special 90-semester-hour
ee program in the School of Public and International Affairs, supplying
porting evidence in the form of achievement test scores, College-Level Ex-
nation Placement (CLEP) scores and grades earned at George Washington
versity or any other institution. The Dean, in consultation with the Dean's
ncil, will determine eligibility for admission to the program, which will be
tive upon the student's entering the School of Public and International
irs at the beginning of the junior year.

addition to the general requirements (see pages 167–69) and the curric-
requirements (see pages 170–73), a student in the 90-semester-hour pro-
must fulfill the following requirements.

The student must receive grades of *A* in 50 percent of the total coursework
45 of the 90 semester hours), and also in 50 per cent of the courses re-
ed in the major.

The student must take at least 60 semester hours in courses beyond the
group level (numbered above 100).

The 90 semester hours of credit must be earned in actual coursework, i.e.,
it through Advanced Placement, special examinations, etc., may not be
ted in the 90 semester hours required for graduation.

udents who qualify for admission to the 90-semester-hour program are en-
aged to begin taking second-group courses (numbered 101-200) as soon as
are qualified to do so, and should seek to obtain a waiver of course pre-
isites in those disciplines in which they have a strong background.

RRICULUM REQUIREMENTS

e recommended by the faculty for graduation, candidates are required to
plete, in addition to the appropriate freshman and sophomore work (see
s 83–85), a minimum of 60 semester hours during the junior and senior
s, as set forth in one of the following curricula.

ing Credit or Waiving Requirements by Examination

information on earning credit or waiving curriculum requirements, see
mbian College of Arts and Sciences, page 80.

Major Fields of Study

Requirements for the five major fields of study leading to the degree of Bach lor of Arts are listed below. Students should consult the appropriate depa ment in the "Courses of Instruction" section of this catalogue for compl course descriptions.

CHINESE LANGUAGE AND LITERATURE

Prerequisite.— A minimum of 60 semester hours in Columbian College (see p 83), or the equivalent from another accredited institution.

Requirements for the Major.—Chin 11–12, 109–10, and 163–64; plus 12 addit semester hours of second-group Chinese literature courses. The student is requ to pass a major examination at the end of the senior year. The coordinated field knowledge upon which the student will be examined includes an active comman modern Chinese language and a general knowledge of Chinese literature and cult A proseminar (Chin 199–200) assists the student in preparation for the major ex nation.

Students in the Chinese Language and Literature program may avail themse of a junior year abroad, as in the East Asian Studies program, China focus below).

EAST ASIAN STUDIES (China and Japan)

The major in East Asian Studies is designed to introduce the student to a Western culture and to provide an understanding of the history, politics, economy of modern China or Japan. The major is interdepartmental an recommended for students who wish a comprehensive study of one of world's major civilizations and for those who contemplate graduate stud Chinese, Japanese, or Far Eastern affairs.

A junior year abroad is available in this program of study for those intere in China. Students should contact the Chairman of the Department of Asian Languages and Literatures.

Prerequisite.—The East Asian Studies curriculum, pages 83–84, including Chi or Japn 3–4.

Requirements for the Major.—(1) Chin 11 (China focus) or minimum of additional hours of Japanese (Japan focus), and 163 or 164; (2) Econ 169 (C focus) or 170 (Japan focus); (3) 3 semester hours selected from Geog 125, 127, 132, 146, or 164; (4) 9 hours selected from Hist 138, 187, 188, 189, 195, (either Hist 187 or 196, but not both, may be selected); selection covering pre-modern and modern periods encouraged; (5) 3 hours selected from PSc 193, 194; (6) 9 semester hours of course work in economics, history, or poli science *not related* to China or Japan, to be selected in consultation with the viser and approved by him; 6 semester hours in research and writing seminar rel to China (China focus) or Japan (Japan focus) and taken in discipline of con tration.

INTERNATIONAL AFFAIRS

The major in International Affairs enables the student to specialize in inte tional political relations, international economics, international communicati or regional studies.

Prerequisite.—The International Affairs curriculum, pages 83–84.

Requirements for the Major.—(1) Econ 181–82; (2) 6 semester hours of a third ear of foreign language (may be a literature course taught in the language); (3) 3 emester hours selected from Geog 125, 126, 127, 132, 135, 146, or 161; (4) Hist 50 or 157, and 182; (5) PSc 171, and 172 or 181; (6) 15 semester hours from ne of the Group Options listed below:

Group I. International Politics—courses concerned with theory and practice in international affairs, forces shaping the world scene, and American foreign policy, selected from Geog 125, 126, 127, 139, 146 (if not elected to satisfy the Geography and Regional Science requirement); Hist 138, 139–40, 149; PSc 107, 111, 112, 117-18, 160, 167, 179, 189 (PSc 172 or 181 may be elected if not taken to satisfy the major requirement).

Group II. International Economics—courses concerned with the world economy and American policy and practice in international trade and finance, selected from BAd 176, 178; Econ 101, 102, 104, 121, 122, 134, 147; Geog 125, 126, 127, 135; Stat 111, 112.

Group III. International Communications—courses concerned with the study of international information programs, public opinion, psychological warfare, cultural relations and public relations, selected from Anth 150, 153, 157, 161, 162; Geog 106, 125; Jour 145, 146; PSc 146, 167; Psyc 115, 151, 156; Soc 144.

Group IV. Regional Study—a concentration in one of the following areas: (1) Africa—courses selected from Anth 178, 179, PSc 189, 190, 192; (2) Europe—courses selected from Econ 147, Hist 131–32, 141–42, 147, 149, 151–52, 158, PSc 111, 112, 117–18; (3) Far East—courses selected from Anth 173, 174, 175, Chin 163–64, Econ 169, Geog 164, Hist 138, 187, 188, 195–96, PSc 101, 193, 194; (4) Latin America—courses selected from Anth 170, 172, 185, Econ 185, Geog 161, Hist 163–64, 165, 166, PSc 177, 178, interdisciplinary seminar 287 offered by six departments participating in the Latin American Studies program; (5) Middle East—courses selected from Anth 177, Hist 149, 158, 193, 194, PSc 179, 180, 191, 192, Rel 161; or (6) Soviet Union and Eastern Europe—courses selected from Econ 133, 134, Hist 138, 143, 145, 146, 188, PSc 112 or 115, 160, 163, Slav 161–62, 165, 166, 193–94.

PUBLIC AFFAIRS

The major in Public Affairs deals with domestic government and policy.

Prerequisite.—The Public Affairs curriculum, page 84.

Requirements for the Major.—(1) Econ 101, 161, 162; (2) Hist 175–76; (3) PSc 121, or 122, 126 or 151, 145; (4) 12 semester hours from one of the Group Options listed below:

Group I. Economics—courses selected from Econ 102, 104, 121, 122, 123, 136, 142, 165, 181–82.

Group II. Politics—courses selected from PSc 103, 104, 108, 111, 119–20, 125, 126 (if not taken as a major requirement), 146, 167, 199.

Group III. Urban Affairs—courses selected from BAd 174; Econ 157; Geog 140, 141, 142; PSc 103, 104; Soc 126; U&RP 153.

URBAN AFFAIRS

The major in Urban Affairs introduces students to the problems and issues of urban America and develops some of the practical skills necessary for dealing with actual decision-making situations in urban-related occupations. Emphasis is on urban public policy—the forces and processes that shape it and its adequacy in terms of current and anticipated needs.

The student may specialize either in the political and administrative aspects of the policy-making process, or in the analysis and evaluation of specific policy areas. An adviser works closely with each student to develop a program suited to personal interests and objectives. In the senior year, the student serves an apprenticeship in an urban-related agency or research organization and also attends a weekly seminar in which the work experience is related to a body of academic literature.

Prerequisite.—The Urban Affairs curriculum, pages 84–85.

Requirements for the Major.—(1) Introduction to Urban Affairs: Econ 157 and one additional 3-semester-hour course in economics, Geog 140, PSc 104, 151, Hist 186; plus two courses selected from Hum 40, 51–52, Soc 126 (waiver of Soc requires permission of the instructor); (2) Urban Research Methods: Stat and PSc 105, plus one course selected from Stat 97, 105, 113, 117, 118, Acct 1–2; (3) Specialized Topics: three courses selected from BAd 174, Econ 162, 165, 243, Geog 141, 142, 143, PAd 246, 249, 250, Soc 223, U&RP 153, (special arrangements necessary to take graduate courses in Public Administration or Urban and Regional Planning); (4) Senior Apprenticeship and Seminar: PSc 184 and 185–86 (the grade of *CR* (Credit) or *NC* (No Credit) will be given for PSc 185–86). A student may elect to fulfill the apprenticeship requirement in a paid position in lieu of registering for PSc 185–86; however, the student must substitute 6 semester hours of elective course work.

Because they participate in the senior apprenticeship and seminar, majors in Urban Affairs may not select courses in the Service-Learning Program.

The Degree of Master of Arts

THIS SCHOOL OFFERS PROGRAMS leading to the degree of Master of Arts in the major fields of International Affairs; Latin American Studies; Public Affairs; Russian Studies; and Science, Technology and Public Policy.

ADMISSION REQUIREMENTS

Application forms are available from the Graduate Admissions Office, School of Public and International Affairs, George Washington University, Washington, D.C. 20052.

A bachelor's degree from an accredited college or university, with a *B* average or better, or the equivalent, in the relevant undergraduate major, is normally required. If there is evidence of special promise, such as high Graduate Record Examination scores, an applicant whose academic record falls short of *B* will be given serious consideration. Scores on the Aptitude Test of the Graduate Record Examinations as well as letters of recommendation are required.

In International Affairs.—The applicant's undergraduate program should include background courses corresponding to the interdepartmental undergraduate major in international affairs at this University (see page 181), or some other relevant social science program. In the case of major deficiencies in the social sciences or international relations, additional course work may be specified beyond the minimum requirements for the master's degree. The student's particular responsibilities will be indicated in the letter of admission to the program and in the course of subsequent consultation with an assigned faculty adviser.

In Latin American Studies.—The applicant's undergraduate program should include background courses corresponding to an undergraduate major in Latin American Studies at this University (see pages 377–78) or equivalent. Majors in other fields may be considered for admission provided their undergraduate course work includes Spanish or Portuguese and sufficient course work in three of the following six areas: anthropology, economics, geography and regional science, Hispanic literature, history and political science.

In Public Affairs.—An undergraduate major in public affairs, economics, history or political science, depending upon the field of specialization in the master's program, is required. Students entering the program are assumed to have had some college-level course work in American government and politics, American history and economic theory. To the extent that a student lacks such a background, the student must, in consultation with an adviser, undertake the appropriate remedial course work, including some courses which may be taken for graduate credit.

In Russian Studies.—An undergraduate major in a pertinent field is required. The undergraduate program should have included the following courses, or equivalent: Hist 145, 146; PSc 112; Slav 1–2 and 3–4, or 5–6.

In Science, Technology and Public Policy.—Undergraduate majors in a social, life or physical science, or in engineering are eligible for admission, although those lacking adequate preparation in relevant social sciences, particularly economics, may be required to take additional courses; such requirements will be indicated in the letter of admission to the program.

Readmission

A graduate student who has not maintained continuous registration and has not registered for one or more semesters must file an application for readmission one semester before planning to return to school. Applications for readmission are reviewed by the Dean and the Committee on Admission.

GENERAL REQUIREMENTS

There are two options available in all fields leading to the Master of Arts degree except Russian Studies. One requires a minimum of 24 semester hours of approved graduate course work plus the successful completion of a thesis; the student must register for six semester hours of *Thesis Research* (299–300). The second option requires a minimum of 36 semester hours of graduate course work and does not include a thesis. In the field of Russian Studies, only the first of these two options, including the thesis, is permitted. The coursework

for both options is taken in preparation for the Master's Comprehensive Exa nation.

Candidates for the degree of Master of Arts are required to submit an viser-approved "Program of Studies" (comprehensive fields, supporting co work, tool requirement, etc.) to the Office of the Dean by the end of the semester in residence.

Master's degrees are awarded by vote of the Faculty after the student completed the required course work and an acceptable thesis (if one is electe has satisfied the foreign language or tool requirement and has passed the M ter's Comprehensive Examination. An applicant whose background does include the necessary courses or equivalent work experience must take a p gram longer than the minimum hours required.

Under special circumstances second-group courses (numbered 101–200) m be counted toward the master's degree when registration for graduate cr has been approved at the beginning of the course by the curriculum adv the instructor, and the Dean. The student who takes an undergraduate co for graduate credit is expected, by arrangement with the instructor, to do w at the graduate level in addition to the regular work of the course. Normal no more than six semester hours of second-group courses may be taken graduate credit in the 30-semester-hour program, and no more than nine se ter hours may be taken for graduate credit in the 36-semester-hour program. work counted toward a bachelor's degree may also be counted toward master's degree.

All work for a master's degree must be completed in five years, unless extension of time is granted by the Dean. A student who is temporarily unab to continue the program of studies may request a leave of absence not to ex one year.

No credit is granted for work done *in absentia* or without formal instruct except for the thesis, which may be completed *in absentia* with the permiss of the curriculum adviser and the Dean. No more than six semester hours graduate credit may be transferred from other accredited institutions or an division of the University, and these may be accepted only under limited co tions of time, grades and relevance to the student's program.

A student who expects to continue studies for the degree of Doctor Philosophy in the field of International Relations after receiving the mas degree in the field of International Affairs is strongly advised to plan fro beginning so that work for the lower degree will fit into a subsequent doc program in the Graduate School of Arts and Sciences (see pages 94–97, 104).

Tool Requirements

In most programs of study a candidate for the degree of Master of Arts demonstrate a reading knowledge (certified by the appropriate language partment) of at least one modern foreign language, to be approved by Dean. A master's degree candidate whose native language is not English not select the native language to meet the tool requirement; the candidate select English to fulfill the requirement with the approval of the adviser and Dean. The examination is administered by the Department of English.

Candidates in the field of Public Affairs and in the field of Science

nology and Public Policy may substitute statistics for a foreign language. This requirement may be met by demonstration of proficiency at the level of Stat 105, 112 or 197.

Candidates in the field of International Affairs may petition the Dean to substitute statistics for a foreign language. The primary basis for approving such petitions will be the relevance of the statistical skills to the student's thesis research.

The language or tool examination should normally be taken before the student has completed the first 15 hours of his work. No student may take the examination more than three times.

Courses taken to fulfill the tool requirement are not counted in the semester-hour requirement for a master's degree.

Master's Comprehensive Examination

In addition to any course examinations, the candidate must pass a written Master's Comprehensive Examination. Examinations are scheduled twice a year (usually in November and April), and should be taken during the last semester of course registration or shortly after the completion of the prescribed coursework. If there is a lapse of time between completion of coursework and the examination, the student must maintain "continuous registration" during this period. The candidate must consult with the adviser, well in advance, as to the date of the examination and the definition of the subject-matter fields which this examination is to cover. An oral examination on the thesis or major report may also be required.

Scholarship Requirements

Grades for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; and *CR*, Credit.

An average of *B* or better is required for the master's degree. The grade of *C* is not considered as failing but must be counter-balanced by a grade of *A* in a graduate course of equal status.

A master's candidate who receives a grade of *F* is required to present cause for consideration by the Dean's Council as to why the student should be allowed to continue in the program of studies.

Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work of the course. Except for Thesis Research courses, an "Incomplete" cannot be made up after the lapse of one calendar year. An "Incomplete" which is not removed by the end of one calendar year remains as a grade of *I* on the student's record. An "Incomplete" cannot be removed by reregistering for the course.

The Thesis

The thesis subject should be selected as early as possible so as to permit effective integration with the coursework.

The subject must be approved by the student's adviser and the member of the Faculty under whom the thesis is to be written. The thesis in its final form

must have the approval of the thesis director *and one other reader*, and tw
copies must be presented to the Dean by the student no later than the da
announced in the Calendar. Printed copies of detailed regulations regarding th
form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the period o
registration, to the advice and direction of the thesis director and the oth
reader. In case a thesis is unfinished, an additional calendar year may b
granted without further tuition payment. The student must, however, maintai
continuous registration (see page 49) during this period. If the preparati
of the thesis extends beyond the additional calendar year, *the student mu
register for the entire six hours of thesis again* and pay tuition as for a repeate
course.

Fields of Study

Specific requirements for each of the five fields of study leading to the degre
of Master of Arts are listed below. For prerequisites, see "Admission Requir
ments," pages 182–83.

INTERNATIONAL AFFAIRS

The interdisciplinary program leading to the degree of Master of Arts in the Sc
of International Affairs provides the student with a wide choice of fields wit
three broad areas of study: general, supplemental or special, and regional.
Graduate courses in anthropology, business administration, economics, geo
raphy and regional science, history, political science, psychology and sociolog
relate to these fields, which are listed below:

General Fields of Study.—International politics, comparative governme
and politics, modern political theory (including socialist and communist the
and international economics.

Supplementary or Special Fields.—International law; international organiz
tion and administration; international economic development; internatio
communications; international and comparative aspects of Communism; U.S
diplomatic history; U.S. foreign policy; and science, technology and pub
policy.

Regional Fields.—Modern history, or government and politics, or econom
history and problems of one of the following: Western Europe, Eastern Euro
the Soviet Union, Latin America, the Middle East, Africa, South and South
Asia and China. Within each geographical area there are normally three fie
of study available.

Each degree candidate must select at least one "general" field. The fie
should also represent at least two disciplines. Beyond these limits, the stud
is free to select any of the fields indicated above as long as they compri
coherent program. Candidates will be examined on their selected fields of s
in the Master's Comprehensive Examination (see page 185).

Candidates who elect to write a thesis must choose *three* of the listed fie
and take, in addition to the thesis, a minimum of 24 semester hours of gradu
coursework in at least two departments, with no more than 15 hours in
one department.

Candidates electing a program without a thesis must choose *four* fields and may take no more than 21 of their required 36 semester hours in one department. They must also include in their program at least two research seminars (six semester hours) requiring the preparation of substantial research papers.

Courses should be chosen, in consultation with the adviser, with a view to their relevance to the selected fields. It should be understood, however, that coursework constitutes only partial preparation for the Master's Comprehensive Examination. Each student is also expected to pursue a program of additional reading in each of the selected fields, in accordance with the advice of the faculty member responsible for instruction in that field.

LATIN AMERICAN STUDIES

The program leading to the degree of Master of Arts in the field of Latin American Studies is designed to provide the student with an appropriate area background in three or four of the following fields: anthropology, economics, geography and regional science, Hispanic literatures, history and political science.

All degree candidates must complete 12 semester hours of graduate work, including the interdisciplinary seminar (287), in a major field selected from those listed above, and six semester hours in each of two minor fields selected from those listed above. A student who elects not to write a thesis, must take six semester hours in a third minor field selected from those listed above, or from the fields of urban and regional planning, economic development or population studies. The student must further complete an additional six semester hours in any of the major or minor fields selected. The tool requirement (see pages 184–85) must be satisfied by demonstration of proficiency in Spanish or Portuguese, or in English if the student's native language is Spanish or Portuguese. The Master's Comprehensive Examination (see page 185) will cover all the student's selected fields.

PUBLIC AFFAIRS

The program leading to the degree of Master of Arts in the field of Public Affairs allows the student to specialize in either domestic economics or domestic politics. The student may select courses in consultation with an adviser to emphasize either political science, economics or American history, provided (1) no more than 15 hours of courses are elected in one department under the 24-hour plus a thesis program, or (2) no more than 21 hours are elected in one department under the 36-hour program without a thesis. Course work may include economics (public finance, monetary theory and policy, labor economics, industrial organization, natural resources and environmental economics, regional and urban economics, economic policy); history (U.S. political history, U.S. economic history, recent U.S. history); political science (domestic politics and government, congress and the presidency, U.S. constitutional law and politics, state and urban politics, political science research methods, and science, technology and public policy).

RUSSIAN STUDIES

The program leading to the degree of Master of Arts in the field of Russ
Studies requires the following courses: Econ 133; Hist 237, 245; PSc 2
229, 269; Slav 161-62 or 165 and 166; and *Thesis Research* (299-300).
thesis, which is required of all students in this field, should be interdisciplin
in approach. With the exception of the thesis, students may, with the appro
of the adviser, substitute alternate courses for those in the required progra

SCIENCE, TECHNOLOGY AND PUBLIC POLICY

The program leading to the degree of Master of Arts in the field of Sci
Technology and Public Policy is flexible and is carefully planned and
ducted in consultation with an adviser. All degree candidates are required
take 12 semester hours in the core field of science, technology and public po
which includes coursework both in science policy and in policy analysis.
second field must be chosen from one currently offered in the internati
affairs or public affairs programs of the School. Students who elect to wri
thesis must select one additional field, and those who elect not to write a th
must select two additional fields. The third (and fourth) fields may also
chosen from those currently offered in international affairs or public affa
or may be interdisciplinary, developed in consultation with the adviser
drawing upon the total resources of the University in order to focus
particular policy issue or area. Such a special field must be approved by
student's adviser and the Dean.

Special Progr

COMBINED MASTER OF ARTS AND JURIS DOCTOR DEGREE PROGRAM

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS cooperates with the
tional Law Center in offering a program leading to the combined degree
Master of Arts and Juris Doctor. A student must be accepted for admissi
both the School of Public and International Affairs and the National
Center. Applications should be made separately, but at the same time.
the School and the Center should be notified that the student is interested
the combined program. The student will be admitted to the School of Pu
and International Affairs for the academic year following the first year of
at the National Law Center, since the National Law Center stipulates
the first year of coursework for the Juris Doctor degree must be taken
unit.

The Master of Arts degree program normally consists of the 30-semes
hour program which includes a thesis. The student selects a major offered
the School and fulfills all of the requirements for the Master of Arts
as well as fulfilling the requirements for the Juris Doctor degree. Up

semester hours of credit for coursework completed as part of the Juris Doctor curriculum and related to the student's master's degree program may be approved for transfer toward the Master of Arts degree. (Some of the course work required for the Master of Arts degree program may be applicable toward the Juris Doctor degree requirements.) Students will be registered in both the School of Public and International Affairs and the National Law Center and must maintain this concurrent registration until all degree requirements have been completed. All work for this combined degree program must be completed in five years, unless an extension of time is granted by the Dean.

INSTITUTE FOR SINO-SOVIET STUDIES

THE INSTITUTE FOR SINO-SOVIET STUDIES provides a program of specialized graduate study and research within the School of Public and International Affairs. Courses of the Institute are drawn from a variety of academic areas and thus provide an interdisciplinary approach to the study of the Soviet Union, Eastern Europe and East Asia, and of the Communist movement within and among the countries of these areas. Faculty members conduct seminars and reading courses in the disciplines of economics, geography, history, language and literature, law, political science and psychology.

Students who are preparing for the degree of Master of Arts in the field of International Affairs in the School of Public and International Affairs, or for the degree of Master of Arts in the field of economics, history, or political science in the Graduate School of Arts and Sciences, with specialization in Sino-Soviet Studies, may take one-half of their coursework from the Institute's program.

Students working toward the degree of Doctor of Philosophy in International Relations with special emphasis on the Sino-Soviet area are expected to combine work in the Institute with work in the fields of economics, history and political science. Doctoral candidates in the field of Political Science will take their Sino-Soviet work in the form of appropriate subfields of the major and minor fields. Doctoral candidates in the field of History are expected to take at least two of the four fields of the degree in the history of the countries of their specialization. All work leading to the degree of Doctor of Philosophy is under the general supervision of the Graduate School of Arts and Sciences and Consultative Committees designated by that School which direct the work of each graduate student upon admission to degree candidacy. A faculty member of the Institute will serve as adviser to the candidate. The candidate's committee will be formed from members of the selected disciplinary department. A candidate for such a degree should assume that the committee will require the substitution of a reading examination in Chinese or Russian for one of the two Western languages normally required for the degree.

Research

Research work is integrated with the teaching program. Members of the research program belong to different disciplines and include not only faculty but also selected graduate students. Research monographs are being published by the Institute.

A special brochure describing in more detail the work of the Institute available upon request.

Interuniversity Research Colloquia

Scholars from George Washington University, American University, Georgetown University, Howard University, the School of Advanced International Studies of Johns Hopkins University and the University of Maryland conduct two interuniversity research colloquia. The Colloquium on East Asia is under the chairmanship of Professor Franz Michael; the Colloquium on Russia and Eastern Europe is under the chairmanship of Professor Andrew Gyorgy. Research in progress by members of the colloquia and plans for future research are discussed at weekly meetings. Advanced graduate students can be admitted on approval of the chairman concerned. They receive three semester hours of academic credit for each semester of participation, which includes preparation of written work of their own.

WAR COLLEGE PROGRAM

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS offers an off-campus program at the National War College leading to the degree of Master of Science in International Affairs. Admission is limited to selected members of the faculty and student bodies of the War College.

The program of study is complementary to that portion of the War College curriculum pertaining especially to international relations and foreign policy.

DIVISION OF UNIVERSITY STUDENTS

Dean J.G. Allee, Jr.
Assistant Dean B.K. Netland

DEAN'S COUNCIL*

J.G. Boswell, A.H. Desmond, H. Kenyon, R.W. Kenny

INTRODUCTION

THE DIVISION OF UNIVERSITY STUDENTS was established in 1930 to make the regular course offerings of the University more generally available to members of this metropolitan community and to others who are not at the time candidates for degrees in this University. In this Division are registered students who wish to undertake university courses for credit or as auditors. University Students, often employed in government or industry, may be taking courses to increase their vocational fitness or to inform themselves on new developments in the arts and sciences. They may be taking courses as a matter of personal interest for cultural enrichment. Such students may be candidates for higher degrees in other institutions, sent here for special work as part of a graduate program. They may be undergraduates, matriculated in other colleges, taking summer sessions courses only or courses for transfer during the regular academic year with the approval of their own institution. They may be students from institutions outside the Washington metropolitan area enrolling in an appropriate "Washington Semester" program. To serve members of such groups and others not enrolled in degree-granting branches of the University is the function of the Division of University Students.

The privilege of attending George Washington University as a nondegree student is granted on the basis of maturity and proper preparation. Because no degree at George Washington University is involved, there can be no meaningful advisory system in the Division. However, students are invited to seek advice from academic departments. University students are urged to apply to the Office of Admissions for transfer to degree-granting branches whenever such action is appropriate.

All courses except those restricted to medical and law students and those limited to specific degree candidates are open to students in the Division of

*The Vice President for Academic Affairs, the Dean and the Assistant Dean of the Division are ex officio members of the Council.

University Students. Students wishing to take Engineering and Applied Scien courses should consult the *School of Engineering and Applied Science Cat logue*.

Registration in a given course may be denied students in this Division wh space is needed for degree candidates. Students in this Division are not eligib to register for independent study or thesis or dissertation research.

An applicant who has been denied admission to any degree-granting bran of the University will not be considered for admission to the Division of Un versity Students for the semester for which the applicant was denied, excep upon written recommendation of the dean of the college or school that denie the applicant. However, an applicant who has been denied may be considere in subsequent semesters.

Nondegree students who have not completed a bachelor's degree may no enroll in graduate courses offered by the School of Government and Busines Administration.

An applicant who has been suspended from any educational institution f poor scholarship will not be considered for admission to the Division of Un versity Students for one calendar year after the effective date of the suspensio

ENTRANCE REQUIREMENTS*

Good character and an academic background appropriate for the program o studies contemplated are required.

A person not working for a degree at this University will be considered f admission to the Division of University Students to take courses for which th applicant has adequate preparation, as determined by the departments con cerned.

Although the deadline for applications for admission to the Division of U versity Students is the Friday before the first day of registration (see page 5, 6), applicants are urged to apply earlier because no special exceptions can b made to permit registration for credit after the last day for adding classes (s page 193) even though the requiring of credentials, records and test scor may delay the action on an application for admission. Insofar as time p full processing permits, applications submitted after the deadline may be co sidered. Subject to the permission of the department concerned, the deadlin for late registration, adding, dropping and withdrawal do not apply to audito

Scholastic records are required of

1. An applicant who has graduated from high school within the previ two calendar years. Such an applicant must pass designated aptitude tests meet the following requirements, which are the same as those for admiss to Columbian College of Arts and Sciences and the School of Government an Business Administration.

a) An acceptable certificate of graduation from an accredited secondar school, showing at least fifteen units† which must include four years English; at least two years of one foreign language; two years of scienc

* Foreign students, see pages 26-28.

† A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

preferably with laboratory instruction; two years of social studies, one of which must be American history; and two years of college preparatory mathematics.

b) The principal's statement that the applicant is prepared to undertake college work.

c) College Entrance Examination Board scores on the Scholastic Aptitude Test and the English Composition Achievement Test.

2. An applicant who has been subject to any form of academic or disciplinary action at any college or university within the previous calendar year.

3. High school students who are applying for the Secondary School Honors Program (see page 195).

4. An applicant who has not completed high school or the equivalent. Such an applicant may be required to take assigned aptitude tests at the University Counseling Center.

Scholastic records may be required of

1. An applicant who has attended any college or university during the previous calendar year.

2. A former student of this University who was on probation or suspended and, since then, has attended another college or university.

3. An applicant who has *ever* been subject to academic or disciplinary action. When scholastic records are required, a student may be admitted for one semester or summer term only, pending receipt of records and under provisions stated by the Office of Admission.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *are stated on pages 21–34; other University regulations, on pages 45–52.*

Prospective and registered students are urged to acquaint themselves with the regulations concerning "Attendance" (see page 45) and "Withdrawal" (see page 47).

The following specifically applies to all students in the Division of University Students:

Last day to add a class for credit—end of first week of classes.

Last day to drop a class for credit or withdraw from the University—end of the ninth week of classes. (See Calendar for beginning date of classes, pages 5, 6).

Equivalent amounts of time apply to the summer sessions.

Academic Work Load

The normal academic work load is not more than 10 hours for a student employed more than 20 hours a week and not more than 17 hours for a full-time student. (Hours for courses graded *I*, "Incomplete," will be included in subsequent academic work load.) Exceptions to those limits must be approved by the Dean.

Scholarship Requirements

A student who fails to maintain the scholarship requirements of this Divisio may be dismissed from the University.

Normally, any course may be repeated for credit. All grades received in th Division of University Students remain on the record, and scholarship requir ments are based on the total record. A course taken for audit may not be re peated for credit (see page 48).

GRADES

Undergraduate.—*A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass, Fail; *I*, Incomplete; *W*, Authorized Withdrawal.

Graduate.—For graduate work, grades are indicated as *A*, Excellent; Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal.

The "credit/no credit" option, which permits students to take courses which they receive the grade of either "Credit" or "No Credit," is not availab to students registered in the Division of University Students.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized W drawal) may be assigned are described on page 46.

Removing an Incomplete.—Although the grade of *I* may remain on the s dent's record indefinitely, the instructor should normally set a period (ma mum of one year) within which the uncompleted work (usually the final exa nation or a required paper) must be made up. The grade of *I* cannot be remov by reregistering for the course here, or by taking its equivalent elsewhere. "Incomplete" cannot be made up after the lapse of one calendar year exc by written permission of the Dean's Council. An "Incomplete" which is removed within one calendar year remains as a grade of *I* on the stud record.

PROBATION AND SUSPENSION

A student not holding a previous degree is subject to the probation and sus sion regulations of Columbian College of Arts and Sciences (see page 75

A student holding a previous degree must maintain a cumulative quality index of 3.00 or the equivalent (a *B* average) in second-group or higher courses and a cumulative index of 2.00 or the equivalent (a *C* average) in group courses. If the cumulative index in second-group or higher level co falls below 3.00, the student will be placed on probation. If the cumul index in second-group or higher level courses falls to 2.25 or below, the st will be suspended. The scholarship regulations for first-group coursework the same as those of Columbian College of Arts and Sciences (see page

A suspended student will not be permitted to register for any cours either for credit or for audit, in the Division during the period of suspens

Changes in Program of Studies

Changes within the Division of University Students.—A student may not change or drop courses (see "Withdrawal," page 47) or change status to that of auditor except with the approval of the Dean.

Change from one section to another of the same course may be made with the approval of the Dean and the department concerned.

Transfer within the University.—Transfer to or from the Division of University Students may be made only with the approval of the deans concerned.

Application for transfer to degree candidacy will be considered only after the completion of at least one semester in the Division of University Students or upon request from the college or school to which the student is seeking admission.

The student wishing to transfer to degree candidacy must meet the conditions of the college or school to which the student is applying. It is the responsibility of the student to consult the relevant degree-granting college or school concerning all conditions to be met and the amount of work transferrable.

Secondary School Honors Program

The outstanding secondary school student in the Washington metropolitan area who wishes to enrich an academic background and participate in stimulating college work is encouraged to seek admission to George Washington University's Secondary School Honors Program. The Honors Student is enrolled in regular college courses of the student's own choosing appropriate to the student's level of study, background and aptitude as determined through consultation with high school counselors and advisers at the University.

Credit earned in the Program is applicable toward a degree at George Washington University should the student later matriculate here. The transfer of credit elsewhere depends upon the policies of the individual schools to which the student might later apply.

Admission to the Honors Program is highly competitive. Normally, only 15 students a semester will be admitted to this Program, and each student will receive a scholarship totaling 50 per cent of tuition (excluding laboratory and University Center fees). Admission is for one semester only, but students doing well will be given preference for continuation and may be readmitted for a second semester. Criteria for admission are based on a transcript of the student's grades to date, available test scores, evidence of emotional and intellectual maturity and the results of the interview with the Director.

Application forms and further information may be obtained from B. K. Setland, Director of the Secondary School Honors Program, Division of University Students, George Washington University, Washington, D.C. 20052. No applications will be considered after the Friday before the final day of registration for the semester concerned. For application for the summer session see the *Summer Sessions Schedules*.

DIVISION OF EXPERIMENTAL PROGRAMS

Director C.C. Mondale

THE UNIVERSITY is committed to the continuous development of new curric
options for its faculty and students. The Division of Experimental Progr
has as its function the support of such curricular experimentation and dev
opment. This University-wide curricular development program has three
jectives: (1) a more direct relationship between campus and off-campus
sources and interests; (2) cooperation among the academic divisions of
University in the development and sponsorship of new courses and progra
and (3) experimentation with new ways of teaching and learning.

Under the auspices of the Division of Experimental Programs, stude
faculty, and administrators throughout the University are involved in
planning, teaching and evaluating of experimental courses and programs. Ma
such curricular experiments are sponsored by other academic units of the U
versity. There are presently two academic programs directly sponsored by
Division, the Program in Experimental Humanities and the Service-Learn
Program.

The Program in Experimental Humanities offers courses which provide
portunities for students to combine sustained field-study with classroom wo
These courses are taught by interdisciplinary and interdivisional faculty tea

The Service-Learning Program integrates supervised work-study with cla
room seminars. Students in the Program are assigned to community grou
research organizations or governmental agencies. Assignments are arranged
means of a formal agreement among the student, the Program and the
campus agency.

The Division of Experimental Programs is charged with mobilizing acade
resources throughout the University that can appropriately address needs
Washington communities, particularly the communities of poverty. Among
activities of the Division is a technical assistance program in the Cong
Heights-Anacostia area, cosponsored by the Anacostia Community Devel
ment Consortium. The Division, in conjunction with the Spanish Educa
Development Center, places bilingual students in the Spanish-speaking
city. It also offers stipends to selected students for work in community a
cies.

The Division of Experimental Programs is funded through a grant from
National Endowment for the Humanities, as well as from the general fu
of the University.

ASSOCIATES

Marshall Davies, *Coordinator of Curriculum Research*
Roderick French, *Coordinator, Humanities Development Program*
Gregory Williams, *Assistant Director, Division of Experimental Programs*

STEERING COMMITTEE

Harold Frederick Bright, *Provost and Vice President for Academic Affairs Chairman*
Marcella Brenner, *Professor of Education*
Ira Hubert Cisin, *Professor of Sociology*
Carl James Lange, *Associate Professor of Psychology; Assistant Vice President for Administration and Research*
Ralph Clarke Nash, *Professor of Law*
Thomas Eugene Piemme, *Professor of Medicine and of Health Care Sciences*
Judith Ann Abrams Plotz, *Associate Professor of English*
Henry Solomon, *Professor of Economics; Dean of the Graduate School of Arts and Sciences*

THE SUMMER SESSIONS

Dean W.F.E. Long
Assistant Dean S.R. Paratore

DURING THE SUMMER OF 1976 Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Government and Business Administration, the School of Public and International Affairs, the School of Engineering and Applied Science, the Division of University Students and the School of Medicine and Health Sciences offer courses in one three-week session, two five-week sessions. The National Law Center offers courses in two six-week sessions and one 13-week session; the School of Education offers courses in six- and nine-week sessions and three three-week workshop sessions. In addition, a carefully planned group of special programs will be offered to serve a variety of student needs.

For a complete statement concerning summer term work, see the *Summer Sessions Schedules*.

OFFICE OF THE VICE PRESIDENT FOR POLICY STUDIES AND SPECIAL PROJECTS

Vice President L.H. Mayo

THE VICE PRESIDENT for Policy Studies and Special Projects is responsible to the President of the University for developing a multidisciplinary University capability for analyzing national policy issues, with involvement by the Consortium universities, foundations, federal agencies, industry and other organizations having interaction with the governmental process.

Working closely with the Vice President for Academic Affairs, the Vice President for Policy Studies and Special Projects assists in developing faculty research capability for policy studies, recommends the introduction of new curricula in the policy analysis area—in particular at the postgraduate and advanced professional levels—and provides a continuing appraisal of the public advisement function of the University. The Office of the Vice President for Policy Studies and Special Projects serves the University as the locus for discussion and as an advisory resource on interdepartmental and interdisciplinary research related to the analysis of public policies and on curricula pertaining to broad social or environmental problems, in which a number of departments and schools participate.

This Office is responsible for coordinating activities of the Program of Policy Studies in Science and Technology with other policy-oriented projects and programs within the University.

PROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY

The primary objective of the Program of Policy Studies in Science and Technology is to encourage the continuing development of a University policy research capability directed toward the complex issues confronting society. As an integral part of the University, the Program undertakes to serve as an organizing element and to provide a neutral forum for the discussion of policy issues—current and prospective—by representing community groups, and as an advisory and research resource for policy makers in both public and private sectors.

Activities of the Program reflect a number of ways in which a wide range of interdisciplinary talents can be brought to bear upon the analysis of policy

problems, particularly those involving the impact of advancing technology on the processes, values and institutions of society.

By means of the Program of Policy Studies in Science and Technology George Washington University is moving toward an institutional approach to the policy analysis function as contrasted with the highly fragmented and largely uncoordinated pattern of "institutes," "centers" and "study groups" which exists at most universities. The Program of Policy Studies concept is novel in its attempt to provide an organization that strengthens the University's ability to address itself to broad issues of public policy. This approach envisages a continuing interaction among the professional staffs of the Program of Policy Studies in Science and Technology, other policy research groups and other faculty members of the schools and departments of the University.

The following are the primary study areas of the Program:

1. The structure and functions of institutions designed to stimulate, utilize, regulate and appraise the application of science and technology to the achievement of basic community goals, and to society's needs, national and international.

2. The application of modern research and development management concepts and skills to the planning, programming and managing of governmental programs and urban social problem areas.

The Program has also undertaken to bring into focus the courses and seminars offered by the University which are directly related to the interface area of science, society and public policy. An announcement is published every fall.

The Program supports or conducts a number of activities, including studies, monographs, special reports and professional seminars with government, industry, policy research and university representatives. An Annual Report of current activities is published in the fall.

Funding sources for the Program of Policy Studies in Science and Technology have included, in addition to the University, a basic institutional grant from NASA and grants and contracts from other sources such as the Environmental Protection Agency, the Department of Transportation, the Office of Education and the Public Health Service (Department of Health, Education and Welfare), the Department of State, the Department of Housing and Urban Development, the Russell Sage Foundation, the National Science Foundation, the Ford Foundation, the Cogar Foundation and the Olin Charitable Trust.

Professional Staff*

Director Louis Mayo, *Vice President for Policy Studies and Special Projects, Professor of Law*

Associate Director Vary Coates, *Senior Staff Scientist and Director, Technology Assessment Group (Political Science)*

Mary Allen, *Research Assistant, Graduate Program in Science, Technology and Public Policy (Political Science)*

Betsy Amin-Arsala, *Consultant (Community Development)*

Robert Anthony, *Consultant (Physics, Systems Modeling)*

Yehuda Atai, *Research Associate (Finance, Statistics and Information Systems)*

* Staff listing consists of members who allocate all or a substantial portion of their effort to Program activities. Directors and members of the staff of other policy study groups in the University participate in the various seminar series, conferences and other activities of the Program.

Guy Black, *Professor of Business Economics*
James Brown, *Senior Staff Scientist; Professor of Law*
Jerry Delli Priscoli, *Research Scientist*
John Ellingson, *Research Assistant (Law)*
Richard Ericson, *Senior Staff Scientist; Professor of Management*
Bernard Finn, *Consultant; Curator, Electricity, Smithsonian Institution*
Harold Federow, *Consultant (Law)*
Joseph Foa, *Professor of Engineering and Applied Science*
Dale Froelich, *Research Associate (Law)*
Mary Hackenbracht, *Research Associate (Law)*
Henry Hitchcock, *Research Assistant, (International Relations)*
Mary Holman, *Professor of Economics*
George E. Humphries, *Consultant (Business Administration)*
Thomas Jaras, *Research Associate (History)*
Ursula Kruse-Vaucienne, *Research Assistant and Director, U.S./U.S.S.R. Science and Technology Exchange Project*
Charles Lamb, *Consultant (Political Science)*
James Lester, *Research Assistant (Political Science)*
John Logsdon, *Research Scientist; Director, Graduate Program in Science, Technology and Public Policy; Associate Professor of Public Affairs and Political Science*
Joseph Margolin, *Senior Staff Scientist; Director, Educational Policy Group*
Milton Marney, *Consultant (Normative Systems Research)*
Marion Misch, *Research Scientist; Deputy Director, Educational Policy Group*
Henry Nau, *Deputy Director, Graduate Program in Science, Technology and Public Policy; Assistant Professor of Political Science and International Affairs*
Michael Phillips, *Research Associate (Law)*
Herman Pollack, *Senior Staff Scientist (Political Science)*
Jillian Regelson, *Senior Staff Assistant (Government Management)*
Noyer Singpurwalla, *Associate Professor of Operations Research*
Malcolm Slesser, *Senior Foreign Energy Scholar; Director, Energy Analysis Unit, University of Strathclyde, Scotland*
George Paul Sloup, *Research Associate (Law)*
Charles Stewart, Jr., *Professor of Economics*
Theodore Suranyi-Unger, Jr., *Senior Staff Scientist (Economics); Research Professor of Economics*
Carol Ulinski, *Research Assistant (Graduate Program in Science, Technology and Public Policy)*
Phillip Vernon, *Research Assistant (Law)*
Ernest Weiss, *Senior Staff Scientist (Transportation Programs Specialist)*
Frederick B. Wood, *Research Scientist (Management)*

Advisory Committee

Chairman: Lloyd Elliott, *President of the University*
Vice Chairman: Bernard Schriever, *Chairman of the Board, Schriever & McKee, Inc., Washington, D.C.*
Harold Bright, *Provost and Vice President for Academic Affairs*
Arthur Burns, *Professor Emeritus of Economics*

Joseph Fisher, *U.S. House of Representatives (Va.-10th Dist.)*
Lawrence Levy, *President, Interprise, Inc., Framingham, Mass.*
Dwight Waldo, *Albert Schweitzer Professor in the Humanities, Syracuse U*
versity
Reuben Wood, *Professor of Chemistry*

HEALTH STAFF SEMINAR (HSS)

Judith Miller, *Director*

The Health Staff Seminar is designed to assist professional staff membe
employed by the executive and legislative branches of the federal governme
in the health field to obtain a more realistic understanding of actual hea
practices and problems, and to improve communications between Washingto
based professional staff members and experts in the field. Exposure to pa
lems and issues facing the entire country is gained primarily through sequen
evening discussions or workshops and, where appropriate, site visits to vari
localities. Although attendance is primarily limited to Congressional aides a
top-level health staff from the many government agencies involved in healt
GWU students and faculty can be accommodated on a space-available basis

CENTER FOR ADMINISTRATIVE JUSTICE

Professional Staff

Director Milton Carrow, *Visiting Professor of Law*

Board of Directors

Chairman Ben Fisher, *Attorney, Washington, D. C.*
Vice Chairman Louis Hector, *Attorney, Miami, Fla.*
Secretary-Budget Officer Franklin Schultz, *Attorney, Washington, D. C.*
Frederick Davis, *Professor of Law, University of Missouri - Columbia*
Henry Friendly, *Justice, United States Court of Appeals, Second Circuit*
York, N. Y.
Victor Rosenblum, *Director, Program in Law and Social Sciences, Northwes*
University
Bernard Schwartz, *Webb Professor of Law, New York University*
Ashley Sellers, *Attorney, Washington, D. C.*
Robert Anthony, *Chairman, Administrative Conference of the United St*
(ex officio member)
Louis Mayo, *Vice President for Policy Studies and Special Projects (ex offi*
member)
Jerre Williams, *Chairman, Section of Administrative Law, American Bar*
sociation (ex officio member)

The Center for Administrative Justice was established by the American
Association and became affiliated with George Washington University in S
tember, 1973.

Its general purpose is the advancement of administrative justice in society and its specific goals are as follows:

to provide educational and training opportunities in the law and related areas involved in the processes of administrative justice;

to engage in basic research in such areas and to undertake particular research projects for governmental and nongovernmental agencies;

to provide a resource for the initiation, exploration and development of new concepts, methods and mechanisms for the improvement of the processes of administrative justice;

to foster the development of ethical standards in the public interest among those engaged in the processes of administrative justice;

to establish and maintain a comprehensive library of materials pertaining to the law and law-related areas of administrative justice;

to publish and disseminate the Center's own and other basic and current materials in such areas; and

to conduct conferences, seminars, workshops, colloquia, institutes and other appropriate means for implementing all of the above goals.

The Center has conducted training courses for state welfare hearing officers and Occupational Safety and Health Review Commission administrative law judges and seminars on economics in regulatory agency practice and on legal drafting techniques. It has also completed several significant research projects, such as one on the efficacy of administrative adjudication in traffic violation cases and a study for the Commonwealth of Pennsylvania which resulted in a proposal for the establishment of a centralized office for state agency hearing proceedings.

For the immediate future the Center is repeating its training program offerings and adding new ones, such as a course on trial techniques in administrative proceedings. Its research efforts will focus on the complex problems of mass administrative justice, seeking to develop fair and effective mechanisms for disposing of large numbers of cases involving governmental delivery of benefits and services to individuals.

Funding for the Center's activities was initially provided by the American Bar Endowment. It now earns a substantial portion of its financial needs through its programs and projects and the balance of its operational costs is supported by contributions from private foundations and corporations.

NSTITUTE FOR EDUCATIONAL LEADERSHIP

Director Samuel Halperin
Director, Education Policy Fellowship Program Paul Schindler
Director, Educational Staff Seminar George Lane
Coordinator, The Associates Program James Browne
Executive Producer, "Options in Education" John Merrow
Director, Postsecondary Education Convening Authority Kenneth Fisher
Chief Administrative Officer Dietra Rogers
Budget Officer June Frank

The Institute for Educational Leadership (IEL) seeks to strengthen present and potential leadership in American education at the policy levels of state

and federal government. Established in 1971, IEL is a policy planning and coordinating agency for a number of related educational programs, including Education Policy Fellowship Program, Educational Staff Seminar, The Associates Program, Postsecondary Education Convening Authority and "Options in Education" over National Public Radio. IEL is supported by a major grant from The Ford Foundation and by various grants from foundations and federal agencies.

The objectives of the Institute are carried out under programs and activities of the following types;

1. *Education Policy Fellowship Program (EPFP)*, formerly Washington Internships in Education, is a national program designed to help provide future leaders the skills in policy-making they must have to exert effective and enlightened leadership in American education. Funds for the program are provided by IEL and by the Rockefeller Foundation.

Since 1965, the program has placed over 250 mid-career persons in one-year internships in public and private agencies involved in educational policy matters. Carefully recruited sponsors, who are themselves key actors in public policy issues, agree to serve as on-the-job mentors by demonstrating, through their daily tasks, how educational policy is shaped at the state or national level. An important ingredient of the program is the informal weekly seminars through which Fellows interact with decision-makers, eminent authorities and leading specialists in education-related fields. National meetings of Fellows with other special groups contribute further to their understanding of educational policy-making. Fellows' salaries are paid by the sponsoring organizations, while the costs of recruitment, placement and continuing professional development are borne by EPFP.

Headquartered in Washington with sites in four states, the EPFP is designed for mid-career persons 25-45 years of age who have completed their academic training. Two-thirds of the 45 participants in 1975-76 have completed the doctorate degree; all have demonstrated substantial leadership skills and a strong commitment to improving the educational system. Although EPFP participants are widely considered to be prime candidates for excellent post-fellowship positions, EPFP does not commit itself to obtaining future employment for them.

2. *Educational Staff Seminar (ESS)* is a professional development program designed for staff members employed by the executive and legislative branches of the federal government in the education field. The goals of ESS are to provide an open forum in which participants can improve their professional capabilities and personal fulfillment on the job by (a) being exposed to new ideas and perspectives; (b) increasing their knowledge of particular subjects and their understanding of how things actually operate in the field; and (c) meeting with other professionals involved in the legislative and policy formulation processes in an informal learning environment which fosters improved professional relationships.

ESS supplements the Washington work experience with a variety of in-service training seminars and in-the-field observation. It was established in 1969 and is funded by IEL and by partial reimbursement from the government agencies served.

3. *The Associates Program (TAP)* is an evolving IEL activity whose emphasis has been the provision of seminars and other forums for legislators

other policy-makers at state capitals. Begun in 1972 with three state educational seminars, TAP now sponsors 21 seminars, all conducted by Associates who, on a part-time basis, arrange five to ten programs annually.

Other TAP efforts include: (a) maintaining a network of state-level generalists (Associates) whose ties to IEL in the nation's capital provide rare linkages among federal and state education policy setters; (b) maintaining similar linkages among agencies, coalitions and individual state leaders seeking to improve processes of state-level decision-making machinery and to narrow the communications gap which separates political and professional leaders. TAP expects that its network will remain flexible and innovative, while developing thoughtful, effective educational policies in the states.

Other IEL Activities

Under a grant from the Department of Health, Education and Welfare's Fund for the Improvement of Postsecondary Education, IEL has established an issue development service for consideration and transmission of key policy issues in postsecondary education. The *Postsecondary Education Convening Authority (PECA)* sponsors conferences, research efforts, task force groups and publications focusing on such issues as institutional licensing, consumer protection and state financing. During 1975-76 the program will add lifelong learning and public policy to its agenda.

IEL and National Public Radio coproduce "Options in Education," a program heard weekly over NPR's 179 member stations. Voice of America rebroadcasts the one-hour programs, and IEL makes cassettes and transcripts available at minimum cost. Funds for "Options in Education" are provided by IEL, the National Institute of Education, the U.S. Office of Education, the Robert S. Clark Foundation and other grantors.

The *Career Education Policy Project (CEPP)* addresses the issues of education, work and society. Funded by the U.S. Office of Education, CEPP uses the resources of other IEL programs—ESS, TAP, "Options"—to sponsor radio broadcasts, seminars and field trips which inform both policy-makers and the public of the issues and potential of the career education movement.

SPONSORED RESEARCH

Vice President for Administration and Research C.J. Lang

THE RESEARCH PROGRAMS listed in this section are special programs which ar established for the specific purpose of attacking in an academic atmosphe problems proposed by the individual projects or submitted by the sponsorin agency. Cooperation between these programs and the various departments o instruction is as close as the nature and needs of the programs and departmen will permit.

BIOMETRIC LABORATORY

Director Richard Bonato

The Biometric Laboratory, established in the fall of 1960 and currently sup ported by the National Institute of Mental Health grant program, is engage in a broad spectrum of psychotropic drug asssesment. The Laboratory assis investigators throughout the United States in planning research and in analyzin data. The majority of these research projects concern the effects of drugs o behavior.

CENTER FOR SOCIAL POLICY STUDIES

Director Sar Levitan

The Center for Social Policy Studies is devoted to the evaluation of federal supported manpower, antipoverty, and related programs. The Center is financ by a grant from the Ford Foundation and offers in conjunction with th Department of Economics graduate courses in labor economics and soc policy.

EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) CLEARINGHOUSE ON HIGHER EDUCATION

Director Peter Muirhead
Associate Director Jonathan Fife

The Educational Resources Information Center (ERIC) Clearinghouse on Higher Education, established in the fall of 1968, is supported by the National Institute of Education. The Clearinghouse is responsible for the acquisition, evaluation, abstracting, indexing and dissemination of research reports and other documents dealing with problems and issues in higher education, prepares state-of-the-art and review papers related to higher education and responds to individual inquiries concerned with higher education.

HEALTH STAFF SEMINAR (HSS)

See the Office of the Vice President for Policy Studies and Special Projects, page 202.

INSTITUTE FOR EDUCATIONAL LEADERSHIP

Education Policy Fellowship Program
Educational Staff Seminar
The Associates Program
Postsecondary Education Convening Authority
Career Education Policy Project
"Options in Education" over National Public Radio
National Conference on Women in Education

See the Office of the Vice President for Policy Studies and Special Projects, pages 203–5.

INSTITUTE FOR MANAGEMENT SCIENCE AND ENGINEERING

Director W.H. Marlow

The Institute for Management Science and Engineering provides a multidisciplinary environment for innovative graduate teaching and substantial opportunities for research activities and public service under diversified sources of external support. Through its Program in Logistics, the Institute performs research leading to the development of a science in logistics featuring principles and methodology for resource allocation problems in civil affairs and national defense efforts.

MID-EAST REGIONAL RESOURCE CENTER

Director Raymond Cottrell

The Mid-East Regional Resource Center is one of 13 similar centers serving th country under contract to the Bureau of Education for the Handicapped, U. S. Office of Education. The region or area served includes Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina and the District of Columbia. The George Washington University has entered into an informal partnership with the University of Kentucky and the University of North Carolina to establish a coordinated Learning Resource System (LRS) for handicapped children.

NATURAL RESOURCES POLICY CENTER

Director Mary Holman

The Natural Resources Policy Center was established in September, 1965, to sponsor faculty and student research in the area of natural resources and environmental quality; to develop and undertake activities that promote undergraduate and graduate education; and to train employees of public resource agencies. The program of the Center focuses particularly on increasing the contribution of the social sciences—economics, planning, and the political institutions of natural resource agencies—so that these disciplines and related fields of knowledge may be brought to bear more fruitfully on contemporary problems relating to the management and development of natural resources. The Natural Resources Policy Center, which provides a focus on natural resource and environmental quality problems and issues, is an integral part of the Department of Economics in both the design of its research program and its courses.

PROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY

See the Office of the Vice President for Policy Studies and Special Projects, pages 199–202.

SOCIAL RESEARCH GROUP

Director Ira Cisin
Associate Director H.J. Parry

The Social Research Group conducts surveys and experiments with concentration on basic research underlying an approach to the solution of social problems.

COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES OF THIS CATALOGUE, under the alphabetically arranged names of the departments of instruction and special interdepartmental programs, are listed the courses of instruction offered by the University. The courses as here listed are subject to change. The University reserves the right to withdraw any course announced.

HOURS OF INSTRUCTION

Classes are scheduled in the morning, afternoon and evening. Evening and daytime sections of the same course are identical, are taught by the same staff of instructors and carry the same amount of credit. By taking the evening and summer classes and extending the time of study beyond the usual four years, a part-time student may complete the requirements and obtain a degree.

EXPLANATION OF COURSE NUMBERS

First-group courses.—Courses numbered from 1 to 100 are planned for students in the freshman and sophomore years. With the approval of the adviser and the dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisites to advanced courses, but they may not be taken for graduate credit.

Second-group courses.—Courses numbered from 101 to 200 are planned for students in the junior and senior years. Except for accounting courses, they may be taken for graduate credit only upon the approval of the Dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work in order to receive graduate credit. Accounting courses numbered 101-200 may not be taken for graduate credit.

Third-group courses.—Courses numbered from 201 to 300 in the Graduate School of Arts and Sciences and the School of Government and Business Administration, and courses numbered 201 to 400 in the School of Education, are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are not open to other undergraduates. Qualified seniors in the School of Government and Business Administration registering for these courses must have a 3.00 average, the prior approval of

the department chairman who is responsible for the graduate course and the prior approval of the Dean. Nondegree students who have not completed a bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

Fourth-group courses.—Courses numbered 301 to 400 in the Graduate School of Arts and Sciences are limited to graduate students; but they are primarily for doctoral candidates. Courses numbered 301 to 400 in the School of Government and Business Administration are limited to doctoral students. In the School of Education fourth-group courses, numbered 401 to 500, are limited to graduate students with master's degrees from accredited institutions.

KEY TO ABBREVIATIONS

The following abbreviations are used in this catalogue for course designations:

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anes	Anesthesiology
Anth	Anthropology
ApSc	Applied Science
Art	Art
ArTh	Art Therapy
Bioc	Biochemistry
BlSc	Biological Sciences
BAd	Business Administration
Cart	Cartography
CH&D	Child Health and Development
Chem	Chemistry
Chin	Chinese
CE	Civil Engineering
Clas	Classics
ClEn	Clinical Engineering
CScI	Computer Science
Derm	Dermatology
Econ	Economics
Educ	Education
EPol	Education Policy
EE	Electrical Engineering
EAd	Engineering Administration
EFL	English as a Foreign Language
EngS	Engineering Science
Engl	English
Envr	Environmental Studies
Hum	Experimental Humanities
ForS	Forensic Sciences
Fren	French
Gnet	Genetics
Geog	Geography and Regional Science
Geod	Geodesy
Geol	Geology
Geop	Geophysics
Germ	Germanic Languages and Literatures
HCA	Health Care Administration
HCS	Health Care Sciences
Hist	History
HonP	Honors Program—Columbian College
HKLS	Human Kinetics and Leisure Studies
Idis	Interdisciplinary Courses
Ital	Italian
Japn	Japanese
Jour	Journalism
Law	Law
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineering
M&PA	Medical and Public Affairs
Med	Medicine
Micr	Microbiology
Mus	Music
NSur	Neurological Surgery
Neur	Neurology
Ob&G	Obstetrics and Gynecology
Ocea	Oceanography
OR	Operations Research
Opth	Ophthalmology
Orth	Orthopaedic Surgery
Otol	Otolaryngology
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
Phys	Physics
Phyl	Physiology
PSc	Political Science
Port	Portuguese
Pchi	Psychiatry and Behavioral Sciences
Psyc	Psychology
PAd	Public Administration
Rad	Radiology
Rel	Religion

SHum	Service-Learning Experimental Humanities	**SpEd**	Special Education
SPSc	Service-Learning Political Science	**SPDR**	Speech and Drama
Slav	Slavic Languages and Literatures	**Stat**	Statistics
Soc	Sociology	**Surg**	Surgery
Span	Spanish	**TCom**	Telecommunication Operations
		U&RP	Urban and Regional Planning
		Urol	Urology
		WStu	Women's Studies

SEMESTER HOURS OF CREDIT

The number of semester hours of credit given for the satisfactory completion of a course is, in most cases, indicated in parentheses after the title of the course. Thus, a year course giving 3 semester hours of credit each semester is marked (3–3), and a semester course giving 3 semester hours of credit is marked (3). A semester hour may be defined as one 50-minute period of class work or of one laboratory period a week for one semester.

TIME OF COURSE OFFERINGS

Following most course descriptions is a parenthetical statement listing the semester (fall or spring) for which the course is scheduled. The term "academic year" is used only with two-semester courses, and indicates that the first half of the course is to be offered in the fall semester and the second half in the spring semester. If no parenthetical statement appears, the course is not scheduled to be offered during the fall or spring semesters of the current academic year. Offerings for the summer sessions are not designated in this catalogue. Students should consult the *Summer Sessions Catalogue* or *Schedule of Classes* for summer offerings. A *Schedule of Classes* is also published for each fall and spring semester which provides information concerning the time of course offerings.

Accounting

Professors E.J.B. Lewis, A.J. Mastro (*Chairman*)
Professorial Lecturer J. Hilmy
Associate Professors F.C. Kurtz, C. Paik, M.G. Gallagher
Associate Professorial Lecturer F.W. Segel
Assistant Professor G. Bodnar
Assistant Professorial Lecturer E.J. Shuchart

Bachelor of Business Administration in the field of Accounting.—See pages 142–49. *Master of Business Administration with a field of concentration in Accounting.*—Prerequisite: a bachelor's degree, see pages 153–54.

Required: the general requirements, pages 154–57. A "common body of knowledge" in business administration is required of all candidates; this knowledge may be obtained as part of an undergraduate degree in business or as part of the total Master of Business Administration degree program at this University. The "common body of knowledge" may be satisfied by the following courses at this University, or the equivalent: Acct 115, BAd 131, 141, 161, 198, Econ 1; Mgt 118; and Stat

111. In addition to this requirement the student's program of study will consist of (1) the "Required Courses in Administration," including Acct 276 (see page 156), (2) Acct 262, 295, BAd 231; (3) (a) for students not electing a thesis—Acct 275, 282, 296 and 6 semester hours of elective, or (b) for students electing a thesis—Acct 275 or 282, and Acct 299, 300, and 6 semester hours of elective. Acct 215 must be taken in place of Acct 275 or 282 if a course in cost and budgetary control was not taken prior to entering the M.B.A. degree program. Elective courses are selected, with the approval of the adviser, from courses in other fields offered by the School; however, no more than 3 hours may be in one field, and none of the courses may be in Accounting.

Programs of study in Accounting leading to the degrees of *Doctor of Business Administration and Doctor of Public Administration*.—See pages 167–70.

Accounting courses numbered below the 200 level may not be taken for graduate credit. Accounting courses numbered 201 and above may not be taken for undergraduate credit.

FIRST GROUP

1–2 **Introductory Accounting** (3–3) Gallagher, Kurt

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communications of significant economic and financial data. There is a $25 laboratory fee for Acct 1. Prerequisite to Acct 2: Acct 1. Students who have received credit for a similar financial accounting course cannot receive credit for Acct 1. (Acct 1 and 2—fall and spring)

SECOND GROUP

101 **Cost and Budgetary Control** (3) Bodnar

Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 215 cannot receive credit for Acct 101. (Fall and spring)

111 **Financial Statement Analysis** (3) Hiller

Analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2. (Spring)

115 **Financial Accounting** (3) Gallagher, Segr

(*Formerly Survey of Financial Accounting*)

Role of accounting in decision-making of external parties; understanding, interpretation and implementation of financial accounting. Students who have received credit for a similar financial accounting course cannot receive credit for Acct 115. (Fall and spring)

121 **Intermediate Accounting** (3) Mas

In-depth study of accounting functions and basic theory; acquisition of assets and services, income and equity accounting, preparation and analysis of financial statements. Prerequisite: Acct 1–2. (Fall)

122 **Intermediate Accounting** (3) K.

An in-depth study of special topics: partnership, consignment, installment, liquidation, retail, estate, and trust accounting. Prerequisite: Acct 1–2

132 **Accounting Theory** (3) Mastro

Current thought as reflected in the pronouncements of leading professional and accounting research associations, major contributions to accounting literature. Prerequisite: Acct 121. (Spring)

141 **Governmental Accounting** (3) Lewis

Appropriation, encumbrance, and fund accounting for governmental and institutional entities. Prerequisite: Acct 1–2. (Fall)

144 **Federal Accounting** (3) Lewis

Accounting procedures in the federal government, with emphasis on agency-level accounts and accounting support for cost-based budgets. Prerequisite: Acct 141.

161 **Federal Income Taxation** (3) Gallagher

Federal income tax concepts applicable to individuals and corporations, differences between tax accounting and financial accounting. (Fall and spring)

162 **Tax Research and Planning** (3) Gallagher

Substantive federal tax provisions relating to corporations, partnerships, security transactions, estates, gifts, and pension and profit-sharing plans; emphasis on tax research and tax-planning objectives.

171 **Auditing** (3) Kurtz

Principles and procedures of auditing: generally accepted auditing standards, internal control, audit objectives and reports, form-preparation-use of audit work papers, audit evidence. Prerequisite: Acct 121. (Fall)

172 **Audit Planning and Control** (3) Kurtz

Standards of audit reporting and other current auditing topics, including application of statistical sampling techniques to auditing, auditing electronic systems, and management advisory services. Prerequisite: Acct 171.

181 **Accounting Systems** (3) Bodnar

Organization and use of accounting information: origination, classification, control, and reporting; development, design, and installation of accounting systems; accounting communication patterns. Prerequisite: Acct 101, 171. (Spring)

191 **Advanced Accounting** (3) Gallagher

Application of accounting theory to special areas: consolidated statements, business combinations, earnings per share, foreign exchange, price-level adjusted statements, source and application of funds. Prerequisite: Acct 121. (Spring)

193 **Business Budgeting** (3) Lewis, Paik

Principles and procedures in the development, installation, and operation of a system of budgetary control to aid management. Prerequisite: Acct 1–2. Students who have received credit for Acct 101 cannot receive credit for Acct 193. (Fall and spring)

196 **Management Decisions and Accounting** (3) Paik

Analysis of data required in capital budgeting, inventory management, and other decisions; cash-flow and probability data; advanced cost accounting systems. Prerequisite: Acct 101.

199 **Accounting Practice Internship** (3) Mast

Concepts, procedures, and standards of auditing practice obtained as an intern with a firm or agency. Prerequisite: 15 semester hours of Ac counting courses (including a course in auditing), senior status, and ap proval of the Chairman of the Department.

THIRD GROUP

215 **Management Accounting** (3) Pa

(*Formerly Survey of Managerial Accounting*)

Role of accounting in management decision-making processes; unde standing of accounting influences on resource allocation decisions in o ganizations. Prerequisite: Acct 115 or a similar financial accounting cours Students who have received credit for a similar managerial accountin course cannot receive credit for Acct 215. (Fall and spring)

231 **Contemporary Accounting Theory** (3) Mast

Accounting principles and concepts and recent theories concerned wit the valuation and amortization of assets and determination of income Prerequisite: 6 semester hours of accounting.

241 **Accounting and Related Disciplines** (3) Pa

Interrelationships of accounting and behavioral sciences, economics, math ematical methods, operations research. Prerequisite: 6 semester hours accounting.

245 **Decision Systems and Accounting** (3) Pa

Limited to students in the Navy Graduate Financial Management Pro gram. Managing financial and related information systems in complex organizations; relationships between accounting in its broadest sense and management control and decision systems.

246 **Governmental Accounting and Budgeting Problems** (3) Lew

Current problems in federal financial planning, programming, budgeting accounting, and auditing. Prerequisite: Acct 144.

262 **Business Income Taxation** (3) Gallag

Federal income tax concepts applicable to corporations, partnerships their owners; emphasis on tax planning factors in business decisions tax research. (Fall)

275 **Contemporary Auditing Theory and Procedures** (3) K

Study of auditing concepts: generally accepted auditing standards, app cation of statistical sampling to auditing, audit of electronic data proce sing systems. Prerequisite: Acct 115 and 215, or equivalent. (Spring

276 **Management Planning and Control** (3) Pa

Integrative case study approach to management systems for planning control, and decisions: value indices for organizational sub-units, transfe pricing, contemporary control systems, accounting framework and cyc Prerequisite: Acct 115 and 215, or equivalent. (Spring)

282 **Accounting Information Systems** (3) Bod

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data p

essing, accounting systems, and management information systems. Prerequisite: Acct 115 and 215, or equivalent. (Fall)

290 **Special Topics in Accounting** (3) Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit. (Fall or spring)

292 **Professional Accounting Review** (3) Lewis
Review and coordination of principles and techniques in preparation for general practice in the field of accountancy and for professional accounting examinations. Prerequisite: Acct 101, 141, 161, 171, and 191.

295 **Research Methods** (3) Paik
(Spring)

296 **Seminar in Accounting** (3) Mastro
Selected accounting studies: critical analysis and evaluation developed in seminar discussions and papers. Prerequisite: Acct 115 and 215, or equivalent. (Spring)

298 **Directed Readings and Research in Accounting** (3) Mastro and Staff

299 **Thesis Seminar** (3) Mastro and Staff
(Fall and spring)

300 **Thesis Research** (3) Mastro and Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Mastro and Staff
Limited to students preparing for the Doctor of Business Administration or Doctor of Public Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Mastro and Staff
Limited to Doctor of Business Administration or Doctor of Public Administration candidates. May be repeated for credit. (Fall and spring)

American Literature

See "English."

American Studies Program

Professors R.H. Walker, Jr., C.C. Mondale, L.W. Brown
Adjunct Professor F. Gutheim
Associate Professor B.M. Mergen (*Director*)

Associate Professorial Lecturer J. Mahoney, Jr.
Assistant Professors H.F. Gillette, Jr., J.S. Zangrando (*Visiting*)
Special Lecturer L. Miller

FACULTY ADVISORY COMMITTEE

B.M. Mergen (*Chairman*), R.N. Ganz, F.S. Grubar, R.L. Humphrey, H.L. LeBlanc, C.H. Pfuntner, R.P. Sharkey, R.W. Stephens, A.M. Yezer, D. Wallace, Jr.

AMERICAN STUDIES COUNCIL

The Council serves the American Studies Program in an advisory capacity from several points of view, as follows:

From the Washington Community

Three members to be selected for 1976-77.

From the Student Body

Two undergraduate students; two graduate students.

From the Alumni

C. Robert Kemble

From Affiliated Programs

John Cole (Library of Congress)
Atlee Schidler (Washington Center for Metropolitan Studies)
Wilcomb Washburn (Smithsonian Institution)

From the Faculty

The American Studies staff of instruction and the Faculty Advisory Committee ex officio.

Bachelor of Arts with a major in American Civilization (Field-of-Study).—The following requirements must be fulfilled.

1. **The general requirements stated on pages 77–78, 85–91.**

2. Prerequisite course—AmCv 71–72. (In preparation for the major field it is recommended that students take the introductory American history course and elect introductory courses in anthropology, art, economics, English, geography and regional science, philosophy, political science, religion and sociology.)

3. Required courses in the major—(a) 15 semester hours of approved second-group courses in the Humanities (History may be elected for (a) or (b), but not for both); (b) 15 semester hours of approved second-group courses in social studies; (c) AmCv 179–80, which must be taken in the senior year.

4. In addition to the "meaningful initiation" requirement (see pages 77–78), students must elect 3 or 4 additional semester hours in the natural and mathematical sciences or in geography and regional science.

The major examination required of all seniors must be satisfactorily completed in the final year.

Special Honors will be awarded to students who fulfill the general requirements (see pages 50–51) and in addition (1) receive grades of *A* in at least half of their courses in the two areas of concentration and (2) receive honors in the major examination.

Two years of a foreign language or adequate preparation in statistics, logic, or statistics is strongly recommended. Students should consult frequently with an American Civilization adviser.

Master of Arts in the field of American Civilization.—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in American Civilization or in the subject in which concentration is contemplated.

Required: the general requirements, pages 95–102, including (1) AMCv 271–72 (6 semester hours), a seminar in the methods and materials for teaching and research in American Civilization; (2) 18 additional semester hours in a carefully related pattern, focusing in a concentrated approach to the study of American Civilization; (3) a master's thesis (6 semester hours) written on an approved topic under the direction of the instructor in whose field the major emphasis falls; (4) a Master's Comprehensive Examination reflecting the candidate's area of concentration. Special options in the degree program include the following:

1. *A concentration in Museum Training.*—Course emphasis on substantive research in material culture under direction of staff at the Smithsonian Institution. Required, in addition to the general requirements outlined above, AmCv 250. Recommended, but not required: AmCv 252, 351 or 352 (advanced research), AmCv 290 (internship) and other related courses offered by the departments of anthropology, history or education.

2. *A concentration in Historic Preservation.*—Course emphasis on interpreting changes in historic preservation through a humanistic framework. Prerequisite: background in urban history. Required: in addition to the general requirements outlined above, AmCv 277–78. Recommended, but not required: additional courses in architectural history, urban and regional planning and local history.

Doctor of Philosophy in the field of American Civilization.—This program combines work in the humanities and or social sciences as preparation for research and teaching, with the option of stressing preparation for museum and library careers. Applicants are required to have an adequate background in the humanities and or social sciences as they apply to the understanding of American civilization.

Required: the general requirements, pages 95–97, 102–104. Candidates must pass a General Examination in four areas. An area in American cultural history and an area in the culture of some area outside the United States (i.e., English Literature, European History) are required. The other two areas may be chosen from the following groups: (1) American diplomatic, economic, political, social or urban history, American literature, art, philosophy or religion; Afro-American history; historic preservation, or some areas of the social and behavioral sciences; (2) in affiliation with the Library of Congress: supervised historical study in bibliographic resources concerning American history and politics, cartography, cross-cultural studies, government documents, graphic arts and music, motion pictures and recorded sound, printing and bookmaking; (3) in affiliation with the Smithsonian Institution (Museum of History and Technology, National Portrait Gallery and National Collection of Fine Arts): supervised studies including architectural history, decorative arts, ethnohistory, historical archaeology, history of science, history of technology, industrial archaeology, material aspects of American civilization and various fields in the history of art. Additional areas of study may be arranged within the University and in the Library of Congress and Smithsonian cooperative programs. Special an-

nouncements concerning these programs are issued periodically and are availa
the Office of the Director of the American Studies Program.

Research fields for the dissertation may be chosen from any of the above c
those dealing with the culture of an area outside the United States.

AMERICAN CIVILIZATION

FIRST GROUP

71–72 **Introduction to American Civilization** (3–3) Me

Themes and issues in American civilization since Colonial times
emphasis on their contemporary importance. (Academic year)

SECOND GROUP

161–62 **Studies in American Literature** (3–3)

Same as Engl 161–62. Major factors in the national cultural traditio
shown by outstanding writers. (Academic year)

179–80 **Proseminar in American Civilization** (3–3) Walker, Bi

Coordinating course for seniors majoring in American Civilization.
(Academic year)

186 **U.S. Urban History**

Same as Hist 186. Development and characteristics of American
(Fall)

192 **The American Cinema** (3) Me

History and criticism of American films. The course will enable the
dent to develop an ability to see and evaluate cinema techniques, to
press the evaluation clearly in writing, and to understand the role of
in the context of American culture. (Spring)

195 **Independent Study** (3)

Open to a limited number of American Civilization majors as
research or as an internship with a Washington museum or
society. Prerequisite: approval of the instructor. (Fall and spring

†197 **Oral History and Interview Techniques** (4)

Introduction to theory and practice of obtaining and using historical
through recorded interviews. Examination of major published work
oral history. Particular attention to ongoing oral history projects
Washington area. (Spring)

THIRD GROUP

225 **History of Washington, D.C.** (3)

Joint offering of the American Studies Program and the departme
history.

* Joint offering of the American Studies Program and the department of speech and dra
† Joint offering of the American Studies Program and the department of history

271–72 **Seminar: Scope and Methods in American Studies** (3–3) Mondale
(Formerly Seminar: Research and Teaching in American Civilization)
Consideration of American studies as an area for research and teaching; introduction to bibliography. Required of candidates for the degree of Master of Arts in the field of American Civilization. (Academic year)

273–74 **Research Seminar: Materials in Afro-American Culture** (3–3) Brown
Prerequisite: Hist 173–74 or equivalent.

[†]277–78 **Historic Preservation** (3-3) Gutheim
The preservation movement and its literature. Review of current experience, preservation practice and techniques. Emerging aspects of historic preservation. Examples of historic, cultural and humanistic values affecting preservation activities. (Academic year)

280 **Seminar: Urban History** (3)
(Spring)

289–90 **Seminar: Topics in American Civilization** (3–3) Walker
Research problems selected by the instructor. Preparation in American Cultural History or other area appropriate to the topic of the seminar. (Academic year)

295 **Independent Study** (arr.) Staff
Limited to master's candidates. Permission of instructor, in writing, required. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

[*]373–74 **Readings on the Negro in American Culture** (3–3) Brown
For students preparing for the Doctor of Philosophy general examination in the field of the Negro in American Culture.

379–80 **Readings in American Cultural History** (3–3) Walker
For students preparing for the Doctor of Philosophy general examination in the field of American Civilization. (Academic year)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

[†] Joint offering of the American Studies Program and the department of history.
[*] Joint offering of the American Studies Program and the departments of history and of urban and regional planning.

COURSES OFFERED IN AFFILIATION WITH THE LIBRARY OF CONGRESS

The Graduate School of Arts and Sciences is affiliated with the Library of Cong in a program leading to the degree of Doctor of Philosophy. The following cou are offered at the Library of Congress by members of its staff:

THIRD GROUP

255–56 **Research Orientation Seminar: Americana in the Library of Congress** (3–3)

Examination of the collections of the Library of Congress with the of increasing understanding of American culture and awareness of brary-oriented research problems and possibilities. For students in affiliated doctoral program, this course may lead directly to a field "Research Materials for the Study of American Life: Their Content, lection, Arrangement, and Use." (Academic year 1977–78 and al nate years)

FOURTH GROUP

355–56 **Practicum: Advanced Library Research** (3–3)

Practical problems in control of library materials with emphasis on lections in the Library of Congress. A reading field in the affiliated gram. Prerequisite: AmCv 255–56. (Academic year)

389 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general exa nation in fields offered in affiliation with the Library of Congress. M be repeated for credit. (Fall and spring)

390 **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations based or or significantly related to collections of the Library of Congress. Stu vised by specialists at the Library. Prerequisite: AmCv 355–56. and spring)

COURSES OFFERED IN AFFILIATION WITH THE SMITHSONIAN INSTITUTION

The Graduate School of Arts and Sciences is affiliated with the Smithsonian Ins tion's Program for Graduate Students in the History of American Civilization. following courses are offered at the Museum of History and Technology and t National Portrait Gallery, by members of their staffs:

THIRD GROUP

250 **Orientation Course: Material Aspects of American Civilization** (3

Familiarization with the historical collections of the Smithsonian Ins tion and introduction to opportunities for research and publication on historical objects. Required of all students in the Master's and toral programs affiliated with the Smithsonian Institution. (Fa

251–52 **Museum Research and Education** (3–3) Washburn and Staff

Supervised work and/or study under the direction of Smithsonian staff members and research associates—museum visitor behavior, costumes and furnishings, decorative arts, and photography as historical documentation. (Fall and spring)

*270 **Seminar: Museum Exhibiting** (3) Mahoney

Selected museum exhibiting problems in the social and natural sciences, including methods and techniques of exhibition, problems of museum communication and education. (Fall)

†284 **Seminar: Studies in American Art and History** (3)

Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. May be repeated for credit. (Fall and spring)

‡294 **Field Research in Historical Archaeology** (3)

Field techniques, including excavation, recording, photography, preservation, laboratory analysis and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md. (Summer 1977)

FOURTH GROUP

351–52 **Research in Selected Aspects of American Civilization** (3–3)

Supervised study and or field work in selected subject areas related to the activities of the Smithsonian Institution. (Fall or spring)

394 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination in fields offered in affiliation with the Smithsonian Institution. May be repeated for credit. (Fall and spring)

395 **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations significantly related to the material aspects of American civilization. Students work under curatorial supervision at the Smithsonian Institution. Prerequisite: AmCv 351–52. May be repeated for credit. (Fall and spring)

Anatomy

Professors C.M. Goss (*Visiting—Medical History*), F.D. Allan, T.N. Johnson, R.S. Snell (*Chairman*), E.N. Albert
Associate Professor M.J. Koering
Assistant Professors D.E. Morse, M.D. Olson

* Joint offering of the American Studies Program and the department of anthropology.
† Joint offering of the American Studies Program and the department of art.
‡ Joint offering of the American Studies Program and the department of anthropology in cooperation with St. Mary's College, the Smithsonian Institution, and the St. Mary's (Md.) City Commission.

Doctor of Philosophy in the field of Anatomy.—Required: the general requir
ments, pages 95–97, 102–104. Candidates must fulfill the tool requirement by demo
strating high proficiency in German, French, or Russian or by demonstrating a reade
knowledge of any two of the above languages. At the discretion of the Departme
one of the above languages may be replaced by the passing with a grade of *B* or bett
of an approved course in biostatistics or computer programming. The General E
amination must cover at least three fields.

Research fields: cell ultrastructure, embryology, gross anatomy, histology, huma
genetics, neuroanatomy and physical anthropology.

202 **Gross Anatomy** (6) Snell and St

Regional dissections of adult cadaver supplemented with lectures 3
X-rays. Laboratory fee, $30. (Fall)

203 **Human Embryology** (1) Al

Origin and development of human body; emphasis on value of embry
ogy in interpreting anatomical anomalies. (Fall)

204 **Neuroanatomy** (2) Johns

Gross and microscopic anatomy of central nervous system and spec
senses. Laboratory fee, $13. (Fall)

205 **Human Microscopic Anatomy** (3) Albert and St

Microscopic structure of cells, tissues, and organs of the human
Laboratory fee, $20. (Fall)

206 **Scanning Electron Microscopy** (3) Albert, Morse, Ols
(Formerly Election Microscopic Histochemistry)

Preparative techniques for various biological tissues, operation of
ning electron microscope and interpretation of micrographs. Laborat
fee, $30. Enrollment limited. (Spring)

208 **Comparative Vertebrate Neurology** (1) Johns

Survey of the evolution of the vertebrate brain. Prerequisite: Anat 2
Laboratory fee, $10. (Spring)

209 **The Use of Audio-visual Techniques in Anatomy** (2) A

Preparation of a significant audio-visual program of some aspect of hum
anatomy. Laboratory fee, $20. (Spring)

210 **The Use of Computers in Anatomy** (2)

Applying computer techniques to the problems of learning anato
Limited enrollment. Laboratory fee, $20. (Spring)

211 **Cell Biology** (2) (Same as Phyl 211)

An integrated survey of the structure, function, and metabolism of
cell, as an introduction to the medical sciences.

212 **Neurobiology** (3) (Same as Phyl 212)

An integrated survey of the structure and function of the human nervo
system, lecture, clinical demonstration, and laboratory. Laboratory
$25.

221–22 **Seminar** (1–1)

Research reports and discussions of special topics by guest lecturers,
and students. (Academic year)

249 **Introduction to Anatomical Research** (1) Staff

Major research techniques as applied to bilogical materials in the various anatomical disciplines. (Fall)

252 **Physical Anthropology** (1) Angel

Variations in man and factors affecting him, human evolution and racial differences, anatomy and culture of ancient man. (Spring)

254 **Fetal Anatomy** (2) Allan

Dissection of midgestational fetus. Comparison of fetal and adult structures. 20 students. Laboratory fee, $10. (Spring)

256 **Human Genetics** (1) C. B. Jacobson

General principles of genetics, new cytogenetics techniques, aneuploidy in man and its significance, biochemical aspects of heredity, genetic counseling. (Spring)

258 **Cytology** (3) Albert and Staff

Detailed study of morphology and function of the cell and its organelles. Basic cytological techniques emphasized. Laboratory fee, $20. (Spring)

260 **Electron Microscopy in Cellular Biology—Lecture** (1) Koering

Introduction to the morphology of the cell and its components. (Spring)

261 **Electron Microscopy in Cellular Biology—Laboratory** (2) Koering

Introduction to the routine processing of specimens; preparation and interpretation of micrographs. Limited enrollment. Admission by permission of instructor. Prerequisite or concurrent registration: Anat 260. Laboratory fee, $15. (Fall and spring)

262 **Gross Anatomy of Upper and Lower Extremities** (2) Snell and Staff

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

264 **Gross Anatomy of Head and Neck** (2) Snell

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

266 **Gross Anatomy of Thorax and Abdomen** (2) Snell

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

268 **Gross Anatomy of Pelvis, Perineum, and Lower Extremity** (2) Snell and Staff

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

270 **Dissection of the Human Brain** (1) Johnson

Dissection of major pathways and nuclei of the brain with consideration of ventricular system; conferences and assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

272 **Autonomic Nervous System** (1)
Development, microscopic and gross anatomy, function of central a peripheral components of autonomic nervous system. (Spring)

276 **Advanced Studies in Anatomy** (1)
Lectures and conferences on selected anatomical subspecialties—cr crinology, teratology, growth, etc. May be repeated for credit. (Spri

288 **Surface Anatomy and Radiology** (1)
Lectures and demonstrations on areas of clinical importance. (Spri

295 **Research** (arr.)
Content differs each time course is offered; may be repeated once credit. Fee to be arranged. (Fall and spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general amination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for cr (Fall and spring)

Anthropology

Professors R.K. Lewis, R.B. McKay (*Research*), R.M. Krulfeld
Professorial Lecturer J.L. Angel
Associate Professors R.L. Humphrey, Jr. (*Chairman*), V.K. Golla, S.L.
Associate Professorial Lecturers A.G. Wright, J. Mahoney, Jr.
Assistant Professors A.S. Brooks, J.W. Pires-Ferreira (*Research*), G.W (*Visiting*), J.E. Yellen
Assistant Professorial Lecturers G. Stuart, S. Hertz
Lecturer C. Rose

Bachelor of Arts with a major in Anthropology (*Departmental*).—The fol requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite course—Anth 1–2.
3. Required courses in other areas—(a) 12 semester hours, or equivale introductory French, German, Russian, or Spanish (or another major langua proved by the department of anthropology); (b) 6 to 12 semester hours of work in related departments. Recommended for ethnological emphasis are in economics, political science, psychology and sociology; for archaeologica phasis, courses in American civilization, art history, geography and re science, geology and history; for emphasis in physical anthropology, cours anatomy and biological sciences. Statistics is strongly recommended for all a pology majors.
4. Requirements for the major—24 to 36 semester hours in second-group An pology courses, including Anth 192 and courses in each of the following categ aspects of culture (courses numbered in the 150s), linguistics (courses num in the 160s), ethnology (courses numbered in the 170s) and physical an pology or archaeology (courses numbered in the 180s). Qualified seniors may

in 200-level courses with permission of the instructor. Up to 6 semester hours of ethnographic or archaeological field school credit may be accepted and applied toward the major with the approval of the department, and majors are encouraged to participate in such summer programs offered here or elsewhere. Opportunities for field and laboratory research participation are also periodically available to exceptionally able students both with staff members conducting research and at one of the several excellent anthropological museum facilities in the area. Credit for such work may be granted through registration for Anth 195.

Bachelor of Arts with a major in Classical Archaeology and Anthropology (Departmental).—An interdepartmental major offered by the departments of anthropology and art. The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult a departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)
2. Prerequisite course—Anth 1–2.
3. Required courses in the major—Anth 152, 158, 177, 183; Art 101, 102, 103, 111; Hist 109, 110. (A reading knowledge of French and German is recommended.)

Master of Arts in the field of Anthropology.—Prerequisite: a Bachelor of Arts degree with a major in Anthropology from this University, or an equivalent degree.

Required: the general requirements, pages 95–102. The minimum requirement consists of 24 semester hours of anthropology courses plus a thesis (equivalent to 6 semester hours). A thesis is preferred; however, under certain circumstances, with the approval of the department, students may elect a program of study consisting of 36 semester hours of anthropology courses without a thesis. There are no specific required courses; however, the student's program must cover the major areas of anthropological interest which have been approved in advance by the department graduate adviser. A reading knowledge examination in one foreign language must be passed before beginning the third semester of graduate work. (A tool requirement in statistics may be substituted for the foreign language reading examination with the approval of the department.) Students who are writing a thesis must take the Master's Comprehensive Examination before registration for the second half of thesis work.

Master of Arts in Anthropology with a concentration in Museum Training.— The program is designed to give the graduate student an overall knowledge of museum operations on both the theoretical and practical levels in combination with a background in the various subdisciplines of anthropology. Prerequisite: a Bachelor of Arts degree with a major in anthropology from this University or an equivalent degree.

Required: The general requirements, pages 95–102. The program of study consists of 36 to 42 hours of course work which may include up to 12 hours of internship (Anth 290 or 295). A limited number of internships are available at the Smithsonian Institution and other area museums. A reading knowledge examination in a major foreign language must be passed before the beginning of the third semester. Statistics or chemistry may also be used as the tool requirement with departmental approval. Although the program does not require a thesis, students will be expected to produce at least one research paper of publishable quality during the course of study. A written Master's Comprehensive Examination encompassing both general anthropology and museum related problems is also required.

Master of Arts in Special Studies in the field of Anthropology with a concentration in Ethnographic Conservation (offered in cooperation with the Department of Art).— Prerequisite: a Bachelor of Arts degree with a major in anthropology from this University, or an equivalent degree, or a Bachelor of Arts degree with a major in art history and additional background in anthropology.

Required: the general requirements, pages 95–102. A minimum of 36 semester hours is required, at least 18 in anthropology and at least 18 in art history. There is no tool requirement. Students must also take (hem 13 unless they have equivalent

undergraduate preparation. Twelve semester hours must be taken in the Anthropology Conservation Laboratory at the Smithsonian Institution: Anth 290 (repeated once for credit); and Art 201–2 or 271–72; permission to take these courses must be obtained from the supervisor of the laboratory prior to beginning the program of study. Additional required courses include Art 292 and 293 and 12 semester hours selected from Anth 264, 266, 270, 291; Art 248, 261, 284.

Departmental prerequisite: Anth 1–2 is prerequisite to all other courses in anthropology. This prerequisite may be waived by permission of instructor.

FIRST GROUP

1–2 **Introductory Anthropology** (3–3) Staff

Anth 1: survey of man's origin, physical evolution, and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior. (Anth 1 and 2—fall and spring)

SECOND GROUP

150 **Comparative Value Systems** (3) Krulfeld

Examination of world views, conceptual systems, and value orientations of representative cultures throughout the world. (Spring, odd years)

151 **Primitive Economics** (3) Krulfeld

Comparative study of various economic organizations, including hunters and gatherers, herders and cultivators. (Spring, odd years)

152 **Man, Culture, and Environment** (3) Humphrey

Basic principles of cultural ecology. Man's interaction with the ecosystem both past and present; emphasis on the application of anthropological precepts to current environmental problems. (Spring, odd years)

153 **Psychological Anthropology** (3) McKay

Relevance of psychological theories to human evolution and the cross-cultural study of personality. Cultural determinants of personality formation and mental health. (Fall)

154 **Mythology and Folklore** (3) Golla

Traditional verbal expression of supernatural or social beliefs; metaphorical thought; verbal art. (Fall)

155 **Primitive Religion** (3) Simons, Golla

Conceptions of the supernatural in nonliterate societies. Examination of religious beliefs and practices. Emphasis on religious process and change. (Spring)

156 **Comparative Political and Legal Systems** (3) Simons

Cross-cultural study of ancient and modern systems of social control; moral, ethical, and legal factors which operate to produce behavioral norms. (Spring)

157 **Primitive Social Organization** (3) Simons

The analysis of the social organization of primitive peoples; kinship, economic, and political systems. (Fall)

158 **Art and Culture** (3) Krulfeld, Humphrey

Study of the art of tribal society, including the role of art in culture, influences upon the artist, and beliefs and practices associated with art production. (Fall or spring)

159 **Ethnography of Knowledge** (3) Golla

The organization of empirical knowledge in literate and nonliterate societies. Processes of hypothesis, deduction, and classification. (Fall, odd years)

161 **Language and Culture** (3) Golla

Structure and semantics of systems of human communication; linguistic change; social aspects of language. (Fall)

162 **Linguistics in Anthropology** (3) Golla

Introduction to general (descriptive and comparative) linguistics. (Spring)

170 **Cultures of the Caribbean** (3) Lewis

Study of the culture history and ways of life of the various cultural groups of the area up to the ethnographic present. (Spring, even years)

171 **Native Peoples of North America** (3) Simons, Humphrey

Comparative study of Indian groups representative of each of the culture areas of the continent. (Fall)

172 **Native Peoples of South America** (3) Stuart

Survey of Indian groups representative of each of the culture areas of the continent. Hacienda, plantation, and urban adaptations of Indian and African groups. (Fall, even years)

173 **Cultures of the Pacific** (3) Lewis

Study of the culture history and ways of life of the native peoples of Melanesia, Micronesia, and Polynesia. (Fall, even years)

174 **Far Eastern Communities** (3) Krulfeld

Study of social organizations, religions, economies, and problems of current anthropological interest for cultures of the Far East, including Japan, Korea, China and India. (Fall, even years)

175 **Cultures of Southeast Asia** (3) Krulfeld

Study of representative Southeast Asian cultures from nonliterate societies to high civilizations. (Fall, odd years)

176 **Cultures of the Circumpolar Region** (3) Humphrey

Survey of the social and economic adaptations to an extreme climate made by peoples of the northern subarctic and arctic regions of North America and Eurasia. (Spring)

177 **Cultures of the Near East** (3) Lewis

Study of the geographic environment, language, religion, and social structure of settled and nomadic peoples of the Near East; emphasis on the Arab world. (Spring, odd years)

178 **Cultures of South and East Africa** (3) Lewis

Comparative examination of the history, cultural development, and contemporary problems of cultures of southern and eastern Negro Africa. (Fall, odd years)

179 **Cultures of West and Central Africa** (3) Lewis

Comparative examination of the history, cultural development, and contemporary problems of cultures of western and central Negro Africa. (Spring, even years)

182 **New World Archaeology** (3) Humphrey

Introduction to archaeological methodology, theory, and survey of New World American culture history from man's entry into the Americas during the Pleistocene period until the time of the first European contacts. (Spring)

183 **Old World Prehistory** (3) Brown

Specific area and periods to be announced in the *Schedule of Classes*. Survey of human prehistory in Europe, Africa, and Asia from the earliest hominid cultures to the beginnings of advanced civilizations and the secondary centers. May be repeated for credit with permission of instructor. (Fall)

184 **Ethnohistory** (3) Stuiver

Cultural reconstruction of behavioral and ideological patterns of past societies. Specific cultural area to be announced in the *Schedule of Classes*. (Spring)

185 **Latin American Archaeology** (3) Humphrey, Stuiver

The culture history of pre-Columbian Latin America from the Paleo-Indian period through the Spanish Conquest, emphasizing the origin and development of Latin American high civilizations. (Spring, odd years)

186 **Physical Anthropology of Modern Man** (3) Angel

Individual and social biology, methods and techniques. Genetic, cultural and ecologic backgrounds of individual and population variation: microevolution, growth, paleodemography, paleopathology, forensic identification techniques. (Spring)

187 **Introduction to Hominid Evolution** (3) Brace

The fossil record of hominid evolution considered in the light of evolutionary theory. Brief review of the earlier antecedents of man, with concentration on the Pleistocene remains. (Spring, odd years)

188 **Primatology** (3) Brace

Physical and behavioral characteristics of the various primate groups and their relationship to human physical and cultural evolution. Frequent meetings at the National Zoological Park. (Fall, odd years)

192 **Anthropological Theory** (3) Krulfeld, Brace

Analysis of the theoretical postulates and assumptions underlying development of modern cultural anthropology. (Fall and spring)

193 **Anthropological Methods** (3) Krulfeld, Lewis

Approaches to library and field research. Conceptual bases and

the delineation of problems; in the selection, analysis, and organization of data; and in the preparation of the final report. (Spring, odd years)

195 **Undergraduate Research** (arr.) Staff

Individual research problems to be arranged with a member of the faculty. May be repeated for credit. (Fall or spring)

THIRD GROUP

202 **Seminar: Recent Trends in Anthropology** (3) Krulfeld

Major topics of interest in contemporary anthropology since the mid-20th century will be taken up in order, stressing current journal and monograph materials. (Spring, odd years)

211 **Problems in Conservation** (3) Rose

212 **Advanced Conservation Techniques** (3) Staff

215 **Field Methods in Cultural Ecology: Pre-Columbian Settlement Patterns in the Tehuacan Valley** (6) Humphrey, Langran

Field and laboratory examination of settlement patterns and sociopolitical structures in pre-Columbian Mesoamerica and their relationship to agricultural water-control systems. (Summer)

254 **Seminar: Folklore in America** (6) Golla

Intensive seminar covering the various aspects of American traditional culture, including the theory and methodology of folklore research. Primary emphasis on Anglo- and Afro-American traditional cultures, with some consideration of other ethnic groups. (Summer)

261 **Seminar: Anthropological Linguistics** (3) Golla

Anthropological study of language—dialectology, ethnosemantics, descriptive and comparative studies of exotic languages. (Spring)

262 **Seminar: Applied Anthropology** (3) Lewis, McKay

Use of anthropological methods and techniques in such specific fields as government, community development, land reform, law, and medicine. (Fall)

263 **Seminar: Culture Contact and Change** (3) Simons

Change in Western and non-Western cultures; emphasis on general processes of change and interaction between simpler and more complex societies. (Fall)

264 **Seminar: Museum Techniques** (3) Humphrey

Principles of anthropological collection, classification, preservation, identification, interpretation, and exhibition of specimens; research and instructional use of the museum. Field trips to area museums. (Fall)

265 **Seminar: Method and Theory in Archaeology** (3) Humphrey, Brooks

Analysis of field techniques, dating methods, and theoretical approaches in reconstructing and interpreting the cultures of the past, utilizing the most recent archaeological techniques. (Spring)

[illegible] departmental course offered by the departments of anthropology and geography and regional

266 **Seminar: Technology** (3) Humphrey, Lew
Cross-cultural examination of the form, function, meaning, and use
material culture and the behavior patterns involved in its productio
(Spring, odd years)

267 **Seminar: Economic Anthropology** (3) Krute
Comparative study of systems of production, distribution, and consum
tion. (Fall)

268 **Seminar: Peasant Society** (3) Krute
Cross-cultural analysis of peasant societies, including an examination
their manner of functioning within their larger social, economic,
cultural context. (Fall)

269 **Seminar: Structural Problems** (3) Sim
Comparative survey of principles of descent, kinship terminology,
formation of descent groups; problems of variation and change in kins
systems and development of kinship models. (Spring)

270 **Seminar: Museum Exhibiting** (3) Mahon
Selected museum exhibiting problems in the social and natural science
including methods and techniques of exhibition, problems of museu
communication, education, etc. Taught at the Smithsonian Institut
(Fall)

272 **Seminar: Topics in Latin American Anthropology** (3)
Research topic selected from among peasant movements, ethnic group
land reform, urbanization, archaeological problems. (Spring)

273 **Seminar: Urban Anthropology** (3) McKay, He
Anthropological investigations of city life from Neolithic beginning to
present. Study of occupational, class, and ethnic communities within cit
as well as ethnographies of entire cities. Adaptation of traditional fi
methods to urban settings. (Spring)

274 **Seminar: Afro-American Culture** (3) McK
An ethnographic survey of racial, linguistic, and cultural attributes
Americans of African ancestry. African antecedents, conditions of mi
tion, experiences in slave and free communities over their 350-year h
tory in the United States. (Spring, even years)

282 **Seminar: Advanced Archaeology—New World Prehistory** (3) Humphrey
(*Formerly Advanced Archaeology—North American Prehistory*)
Analysis in depth of current archaeological problems relating to the ori
and development of aboriginal cultures. Specific topic to be announc
in the *Schedule of Classes.* (Fall)

283 **Seminar: Topics in Old World Anthropology—Physical Anthropology and Archaeology** (3) Bro
Study of current problems in relation to materials from the old wor
Specific area to be announced in the *Schedule of Classes.* (Spring,
years)

* Joint offering of the department of anthropology and the American Studies Program

287 **Seminar: Problems in Latin American Civilization** (3) Staff

Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspects of a selected key theme. Admission by permission of instructor. (Spring)

290 **Advanced Museum Research** (3) Staff

Supervised individual research and/or field work at the Smithsonian Institution, arranged in consultation with the Smithsonian and the Department of Anthropology. Admission by permission of the Chairman of the Department. May be repeated for credit. (Fall and spring)

291 **Seminar: Museology** (3) Wright

Twentieth century development of museums—natural history, science, and history; their history, philosophy, and organization; their civic importance and administrative problems. (Spring)

*292 **Introduction to Conservation** (3) Rose

Method and theory of conservation, including fine arts, ethnographic archaeological and monuments conservation; handling, restoration, preservation, storage, and display of museum specimens; basic materials of ethnographic objects and the ways they react to their environment. (Fall)

*293 **Conservation Laboratory Techniques** (3) Rose

Examination procedures and analytical techniques used in the conservation laboratory, including discussion of chemical composition of solvents, adhesives, coating, and filling materials used in the restoration and stabilization of museum specimens. Prerequisite: Anth 292, Chem 13. Taught at the Smithsonian Conservation Laboratory. (Spring)

†294 **Field Research in Historical Archaeology** (3)

Field techniques, including excavation, recording, photography, preservation, laboratory analysis and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md. (Summer 1977)

295 **Research** (arr.) Staff

May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

Art

Professors W.A. MacDonald (*Chairman*), L.P. Leite (*Emeritus*), F.S. Grubar
Professorial Lecturers Grace Evans, J. Shapley, D.A. Brown
Associate Professor D.H. Teller
Adjunct Associate Professor Grose Evans

* Interdepartmental course offered by the departments of anthropology and art
† Joint offering of the department of anthropology and the American Studies Program, in cooperation with St. Mary's College, the Smithsonian Institution, and the St. Mary's (Md.) City Commission.

Assistant Professors H.I. Gates, L.F. Robinson, W.T. Woodward, F. Griffith, J.F. Wright, Jr., J.L. Lake, A.H. Smith, T. Özdogan, J.C. Anderson, D.M. Hitchcock

Assistant Professorial Lecturers E.L. Battaglia, L.V. Feinstein, B. Von Barghahn, E.P. Lawson

Lecturer C.R. Rose

Special Lecturer L. Miller

Faculty of the Corcoran School of Art: Roy Slade (*Dean of the School*), Peter Thomas (*Dean*), Leon Berkowitz, Joe Cameron, William Christenberry, Terry Dale, Gene Davis, Michael Day, Frank DiPerna, William Dutterer, Mary Beth Edelson, Robert Epstein, Eugene Frederick, Gary Glover, Tom Green, Samuel Holvey, Andrew Hudson, Paul Kennedy, Blaine Larson, William Lombardo, Ed McGowin, Michael Mitchell, William Newman, Robert Newmann, Jack Perlmutter, Fred Pitts, Mark Power, Barbara Price, Kywal Ramkissoon, Paul Reed, Berthold Schumtzhart, Rona Slade, Robert Stackhouse, A. Brockie Stevenson, Elliott Thompson, Franklin White

Bachelor of Arts with a major in Art History (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Art 31–32 or 71–72.

3. Required courses in related areas—Art 137; Fren 1–2, 3–4, or Germ 1–2, 3–4; Phil 162; or equivalent. (A reading knowledge of French or German should be acquired as soon as possible. Students who plan to do advanced work in classical archaeology or medieval art are also advised to study Greek and Latin.)

4. Required courses in the major—Art 101 or 102, 104 or 105, 108, 109, 110, 112, 113 or 114, 117 or 118; 12 additional semester hours in second-group Art History courses.

5. A maximum of 9 semester hours in Fine Arts, including Art 137, is permitted.

Art history majors may apply for graduation with Special Honors. In order to be accepted into this program, students must satisfy the general requirements (pages 50–51). They should apply in writing to the chairman of the department of art at the beginning of their senior year. Before admittance to the program, they must pass a reading examination administered by the department in either French or German. Upon acceptance, candidates will be assigned to one or more faculty advisers under whose direction they will undertake a supervised program of selected reading on which they will be required to submit written, critical reports.

The department of art has established a program of study in affiliation with area private art galleries. This program is open to a limited number of qualified undergraduate students. For details, consult the chairman of the department of art.

Bachelor of Arts with a major in Fine Arts (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Art 21–22, 41–42 (students concentrating in photography substitute Art 23–24 for 41–42).

3. Required courses in related areas—Art 31–32; 6 additional semester hours in second-group Art History courses.

3. Required courses in the major—27 semester hours of first- or second-group Fine Arts courses in seven areas—ceramics, design, drawing, graphics, painting, photography, and sculpture. Students choose one of these areas as a primary area of concentration, in which 12 semester hours are required. The remaining 15 semester hours must be distributed among the other areas, but only in the primary area can work taken amount to 12 semester hours. (Transfer students must take at least 12 semester hours of second-group fine arts courses in residence at this University, no matter how much advanced standing in fine arts is granted upon admission.)

Fine arts seniors may apply for graduation with Special Honors. In order to be accepted into this program, the student must satisfy the general requirements (see pages 50–51). They should apply in writing to the chairman of the department of art at the beginning of their senior year. Upon acceptance, each candidate will be assigned one or more faculty advisers under whose direction he will complete a project in his special area of interest. Upon completion of the project, the student will present a one-man exhibit prepared exclusively outside of class, subject to the examination of an Honors Board.

Bachelor of Arts with a major in Classical Archaeology and Anthropology (Departmental).—An interdepartmental major offered by the departments of art and anthropology. The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult a departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)
2. Prerequisite course—Anth 1–2.
3. Required courses in the major—Anth 152, 158, 177, 183; Art 101, 102, 103, Hist 109, 110. (A reading knowledge of French and German is recommended.)

Bachelor of Arts with a major in Classical Archaeology and Classics (Departmental). An interdepartmental major offered by the departments of art and classics. The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult a departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)
2. Prerequisite courses—Clas 1–2, 3, 4; or Clas 11–12, 13–14.
3. Required courses in the major—Art 101, 102, 103, 111; Hist 109, 110; 14 semester hours of second-group courses in Greek or Latin, including Clas 138. (A reading knowledge of French and German is recommended.)

Master of Arts in the field of Art History.—Prerequisite: a Bachelor of Arts degree with a major in Art History from this University, or an equivalent degree. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

1. *With a concentration in Classical Art and Archaeology, American Art, Renaissance and Baroque Art,* and *Contemporary Art.*—Required: the general requirements, pages 95–102. As many as possible of the 24 semester hours of course work should be third-group courses. The courses must be completed in 6 semesters or less, with a grade of *A* in at least 6 semester hours of work, and with an overall quality-point index of at least 3.25. A reading knowledge examination, preferably in German or French, must be passed after completing 9 semester hours of course work. A general written Master's Comprehensive Examination on the problems in the field of art history and a written thesis (equivalent to 6 semester hours) embodying the result of research on some specific topic in the history and theory of art are also required. For details, consult the chairman of the department of art.

2. *With a concentration in Museum Training.*—Required: the general requirements, pages 95–102. The program of study consists of 36 semester hours of work as follows: 12 hours of art history courses (taken before acceptance to degree candidacy, see below); Art 201–2, 271–72; and 12 additional hours of art history courses selected in consultation with the adviser. Grades of *A* are required in at least two courses, and an overall quality-point index of at least 3.25 must be main-

tained. A reading knowledge examination, preferable in German or French, must
passed after completion of 9 semester hours of course work. For details, consu
the chairman of the department of art.

Acceptance in this degree program as a *degree candidate* is provisional, pendi
the satisfactory completion of 12 semester hours of graduate art history cours
(this requirement will be counted toward the total semester hours required for
degree). Upon completion of these courses the student must make formal applic
tion in writing for *degree candidacy* to the joint George Washington Univers
National Collection of Fine Arts Committee on Museum Training. The applicat
should state the reasons and aims for seeking this degree, and the student sho
submit letters of recommendation with the application. A personal interview will
be required.

The department of art also has established a program of study in affiliation w
the Textile Museum, the Corcoran Gallery of Art, the African Museum, the H
horn Museum and Sculpture Garden and area private art galleries. Students wishi
to earn graduate credit in this program should consult the chairman of the dep
ment of art.

3. *With a concentration in Museum Administration.*—For details consult
chairman of the department of art.

*Master of Arts in the field of Classical Archaeology, Classics, and History (
interdepartmental degree program offered by the departments of Art, Classics, a
History).*—Prerequisite: A bachelor's degree with a background in Classical Arch
ology and either Greek or Latin. Applicants from other institutions must pres
scores on the Graduate Record Examination to the Office of the Graduate Scho
of Arts and Sciences.

Required: the general requirements, pages 95–102. The program of study (
sists of 24 semester hours of course work (as many as possible should be th
group courses) selected in consultation with the appropriate adviser from the
partments of art, classics and history; plus a thesis (equivalent to 6 additio
semester hours). Candidates must pass a reading knowledge examination in Fre
or German. All candidates are required to pass a general Master's Comprehens
Examination.

*Master of Arts in Special Studies with a concentration in Ethnographic Conse
tion.*—An interdepartmental program offered by the departments of anthropo
and art history. Required: the general requirements, pages 95–102. The prog
study consists of 36 semester hours as follows: a minimum of 18 hours in Anth
pology and a minimum of 18 hours in art history. Twelve of the 36 hours must
taken in the Anthropology Conservation Laboratory at the Smithsonian Insti
The courses for this laboratory are Anth 290, Art 201–2, and/or Art 271–72. T
the work requires 20 hours a week for four semesters. Admission to the laborat
courses requires the permission of the Supervisor of the Anthropology Conserv
Laboratory and must be obtained prior to beginning the program of studies. Re
courses include Anth 292 and 293, or Art 292 and 293; Chem 13 or equivalent
at least four of the following: Anth 264, 266, 270, 291, Art 248, 261, or 284.

*Master of Fine Arts in the field of Ceramics, Design, Graphics, Painting, Pho
raphy, or Sculpture.*—Prerequisite: a Bachelor of Arts degree with a major in
Arts in the field of ceramics, design, drawing, graphics, painting, photograph
sculpture from this University, or an equivalent degree. Students planning
graduate work in the field of graphics or painting must have 12 semester h
of drawing on the undergraduate level prior to admittance to the master's de
program.

Required: the general requirements, pages 95–102. In lieu of the foreign lan
requirement, Master of Fine Arts candidates are required to take 3 additional
of course work in consultation with the adviser; as many as possible of the re
ing 24 hours of course work should be in third-group courses, only 18 hours
which may be in one area, the remaining 6 to be selected from related are

nsultation with the adviser; and a written Master's Comprehensive Examination. A reative thesis (equivalent to 6 semester hours) in ceramics, design, graphics, painting, hotography, or sculpture, and a paper discussing some technical phase of the problem lustrated by the thesis are also required. A representative portion of the work il- strating the creative thesis may be retained by the University at the discretion of he thesis director in agreement with the second reader. For details, consult the chair- an of the department of art.

Students wishing to earn graduate credit in exhibition and display design should consult the chairman of the department of art.

Doctor of Philosophy in the field of Art History.—Required: the general require- ents, pages 95–97, 102–104. Candidates must also pass written examinations in French and German or any other appropriate foreign language, a General Examina- ion in art history, an examination in the area of specialization, and examinations in wo areas related to the area of specialization. Each student plans his program in consultation with a departmental committee.

Areas of Specialization: classical art and archaeology, Renaissance art, Baroque rt, eighteenth century art, nineteenth century art, twentieth century art and merican art.

Bachelor of Arts in Education with a teaching field in Art.—Prerequisite: the ducation curriculum, pages 81–82.

Required: the art option and professional courses listed on pages 117–18, 126.

RT HISTORY

irst Group

1 **Introduction to Art** (3) Staff
(Summer)

31–32 **Survey of Western Art** (3–3) Robinson and Staff
Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art. Art 31: Pre-historic to Gothic art. Art 32: proto-Renaissance to contemporary art. (Art 31 and 32—fall and spring)

71–72 **Introduction to the Arts in America** (3–3) Grubar and Staff
Painting, sculpture, and architecture of America, with selected references to crafts and popular arts. Art 71: from Colonial beginnings to the Republican Age. Art 72: from 19th century to the present. (Art 71 and 72—fall and spring)

cond Group

101 **Greek Architecture or Roman Architecture** (3) MacDonald
(Fall)

102 **Greek Sculpture or Roman Sculpture** (3) MacDonald
(Spring)

103 **Classical Iconography** (3) MacDonald
Origin and development of myths in classical art.

104 **Renaissance Art in Italy I** (3) Grace Evans, Anderso
Early developments from the 13th to the 15th century. (Fall)

105 **Renaissance Art in Italy II** (3) Grace Evans
High Renaissance and Mannerism. (Spring)

106 **Renaissance Art in the North I** (3) Hitchcock
Fifteenth century painting in the Netherlands, Germany, France, and Spain. (Fall)

107 **Renaissance Art in the North II** (3) Hitchcock
Sixteenth century painting in the Netherlands, Germany, France, and Spain. (Spring)

108 **18th Century Art in Europe** (3) Hitchcock
Development of painting, sculpture, and architecture. (Spring)

109 **19th Century Art in Europe** (3) Robinson
Painting and sculpture. (Fall and spring)

110 **Contemporary Art** (3) Robinson
Painting and sculpture in 20th century Europe. (Fall and spring)

111 **Classical Archaeology** (3) MacDonald
Archaeological monuments of classical civilizations, with intensive study of one or more areas selected from architecture, sculpture, painting, minor arts.

112 **Art of Egypt and the Ancient Orient** (3) MacDon
Study of the art of Mesopotamia, Anatolia, Egypt, and Persia. (Spring)

113 **Baroque Art in Italy** (3) Grose Evans
Development of painting, sculpture, and architecture in 16th and 17th century Italy. (Spring)

114 **Baroque Art in the North** (3) Hitchcock
Development of painting, sculpture, and architecture in the 16th and 17th centuries in Holland, Flanders, Spain, France, Germany, and England. (Fall)

115 **Christian Iconography** (3) Anderson
Origins and development of Christian symbols and themes from early Christian to modern times.

116 **Islamic Art** (3) Shapiro

117 **Medieval Art I** (3) Grace Evans, Anderson
Architecture, sculpture, and painting of the early Christian and Byzantine periods. (Fall)

118 **Medieval Art II** (3) Grace Evans, Anderson
Architecture, sculpture, and painting of the Romanesque and Gothic periods. (Spring)

119 **Pre-Romanesque Art in the North** (3) Grace Evans, Anderson
The Merovingian and Carolingian periods. (Spring)

120 **Art of China and Japan** (3) Von Barghan
Architecture, painting, and sculpture of China, Korea, and Japan. (Fall)

121 **History of Spanish Painting from the Catalan Frescoes through El Greco** (3) Von Barghahn

122 **History of Spanish Painting from Ribera through Goya** (3) Von Barghahn

129–30 **Principles of Museum Work** (3–3) Lawson
(Formerly Art 146 [3])
Introduction to the history and development of museums; problems of museum administration, connoisseurship, cataloguing, installation, conservation, and educational service. (Academic year)

140 **Gothic Architecture** (3) Staff

145 **Folk Arts in America** (3) Grose Evans
Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts. (Fall)

147 **Pre-Columbian Art** (3) Staff

148 **19th Century American Painting** (3) Grubar, Grose Evans
(Fall)

149 **19th Century American Sculpture** (3) Grubar
(Spring)

150 **Landmarks in American Art** (3) Grubar

155 **Etruscan Art and Archaeology** (6) MacDonald
Offered off campus through the College of General Studies.

156 **Early Medieval Sculpture** (3) Evans

161 **Monuments of Christian Rome** (3) Anderson

162 **The Art of Oriental Rugs** (3) MacDonald

165 **African Art** (3) Lamp

167 **French Painting: 15th and 16th Centuries** (3) Staff

168 **French Painting: 17th Century** (3) Staff

Third Group

201–2 **Museum Projects** (3–3) Staff
Open only to candidates for the degree of Master of Arts in the fields of Museum Training and Ethnographic Conservation. Practical work to be determined by Museum Training Committees at the institutions involved. (Academic year)

*203 **Primitive Art** (3) Staff
Arts of prehistoric and primitive man in Europe, the pre-Columbian Americas, Oceania, and Africa. (Spring)

*207 **Modern Architecture** (3) Mille
Development of modern architecture and building technology in Europe and America from the late 19th century to the present. (Fall)

211 **Problems in Conservation** (3) Rose

212 **Advanced Conservation Techniques** (3) Staff

213 **Museum Administration and Government** (3) McGrat

214 **Museum Administration and Trusteeship** (3) McGrat

216 **Medieval Painting** (3) Grace Evans
Painting and the decorative arts.

217–18 **Problems in Museum Work** (3–3) McGrat

†220 **Seminar: Baroque Art of the 17th Century** (3) Hitchcock
Specific area announced in *Schedule of Classes*. A reading knowledge of Italian is desirable for the Italian area and German for the northern area. (Spring)

†221 **Seminar: Renaissance Art** (3) Staff
Specific area announced in *Schedule of Classes*. A reading knowledge of French, German, or Italian is desirable, depending on the specific area. (Fall and spring)

242 **Etruscan Art and Archaeology** (6) MacD
Offered off campus through the College of General Studies.

†243 **Seminar: American Art** (3) Grube
Specific area announced in *Schedule of Classes*. (Fall and spring)

244 **Seminar: 19th Century European Art** (3) Robinson
Specific area announced in *Schedule of Classes*. Reading knowledge of French desirable.

245 **Seminar: 20th Century European Art** (3) Staff
Specific area announced in *Schedule of Classes*.

246 **Seminar: Classical Art** (3) MacDonald
Specific area announced in *Schedule of Classes*.

247 **Seminar: Medieval Art** (3) Grace Evans, Anderson
Specific area announced in *Schedule of Classes*.

248 **Independent Research in Art History** (3)
For Master's degree candidates; open to limited number of qualified undergraduates, with permission. Independent research arranged in consultation with individual instructor and graduate adviser. May be repeated for credit. (Fall and spring)

* May be taken for undergraduate credit with the approval of the instructor.
† May be repeated for credit if the specific area covered is different.

261 **Seminar: Problems in Art History** (3) Staff

Recommended for Art History majors; open to limited number of qualified undergraduates, with permission of instructor. Theory, criticism, or methodology of art history. May be repeated for credit. Topic to be announced in *Schedule of Classes*. (Fall and spring)

271–72 **Museum Techniques** (3–3) Staff

Open only to candidates for the degree of Master of Arts in the fields of Museum Training and Ethnographic Conservation. Practical work to be determined by Museum Training Committees at the institutions involved. (Academic year)

†284 **Seminar: Studies in American Art and History** (3) Staff

Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. (Spring)

289–90 **Thesis Research** (3–3) Staff

(Fall and spring)

†292 **Introduction to Conservation** (3) Rose

Method and theory of conservation, including fine arts, ethnographic archaeological and monuments conservation; handling, restoration, preservation, storage, and display of museum specimens; basic materials of ethnographic objects and the ways they react to their environment. (Fall)

†293 **Conservation Laboratory Techniques** (3) Rose

Examination procedures and analytical techniques used in the conservation laboratory, including discussion of chemical composition of solvents, adhesives, coating, and filling materials used in the restoration and stabilization of museum specimens. Taught at the Smithsonian Conservation Laboratory. Prerequisite: Anth 292, Chem 13. (Spring)

NE ARTS

less otherwise indicated, fine arts courses taught in University studios carry no terial or laboratory fees; students must purchase their own materials. Laboraand material fees for courses taught at the Corcoran School of Art (CSA) are ed in the course description and are payable at the School.
ourses taught at the Corcoran School of Art have the designation "Corcoran ulty" for the instructor.

Departmental prerequisite: Art 21–22 and 41–42 (students concentrating in photogby substitute Art 23–24 for 41–42) or permission of department chairman is requisite to all other studio courses in art.

t Group

21–22 **Design I: Basic** (3–3) Staff

Fundamental studies of principles and elements of design. Art 21: study of two-dimensional design. Art 22: three-dimensional studies. Art 21:

affering of the department of art and the American Studies Program in affiliation with the t Portrait Gallery of the Smithsonian Institution.
epartmental course offered by the departments of art and anthropology.
uired of all fine arts majors.

Laboratory fee, $10. Art 22: Laboratory fee, $15. (Art 21 and 2
fall and spring)

23–24 **Fundamentals of Photography** (3–3) Lake, Corcoran Facu

Fundamental techniques of photography; emphasis on creative expressi
Laboratory fee, $35 a semester. When taught at CSA Art 23 is prereq
site for Art 24. (Art 23 and 24—fall and spring)

41–42 **Drawing I** (3–3) Wright, Corcoran Facu

Concepts of drawing, traditional and contemporary; training in perce
tion, analysis of form, use of media, and exercises in connoisseurshi
Material and model fee when taught on GWU campus, $15 a semest
(Art 41 and 42—fall and spring)

51–52 **Ceramics I** (3–3) Özdogan, Corcoran Facu

Working with clay as an art form. Basic techniques of hand building a
wheel throwing. Laboratory fee, $45 a semester. (Academic yea

57–58 **Graphics I** (3–3) Griffith, Wri

Exploration of the methods of intaglio, relief, printing, and other co
posite processes. Material fee, $20 a semester. (Academic year)

61–62 **Water Color** (3–3) Corcoran Facul

Painting in transparent and opaque water color and in acrylic. Experim
tation, figurative and landscape. (Academic year)

65–66 **Painting I** (3–3) Smith, Corcoran Fac

Emphasis on personal expression with exposure to a variety of st
and attitudes. Use of acrylic and oil. Material fee, $12 a semester.
(Academic year)

81–82 **Sculpture I** (3–3) Gates, Corcoran Fac

Three-dimensional design. Basic sculptural techniques; modeling, carvi
and construction. Media include wood, clay, stone, plaster. Laborat
fee: when taught on GWU campus, $15 a semester; when taught
CSA, $30 a semester. (Academic year)

Second Group

Second-group art courses may be repeated for credit with approval of departm

123–24 **Design II: Individual Problems** (3–3)

Emphasis on the individual student and the problems and materials
specifically interest him in any area of design. Laboratory fee, $4
semester hour of credit. (Academic year)

*125–26 **Painting II** (3 or 6–3 or 6) Smith, Corcoran Fac

Emphasis on personal expression; exposure to a variety of styles
attitudes. Materials and techniques subordinate to individual expe
tation. Use of acrylic and oil. Material fee each semester: $12 f
semester hours; $24 for 6 semester hours. (Academic year)

*127–28 **Painting III** (3 or 6–3 or 6) Woodw

Exploration of problems in developing a personal visual imagery. Mat

* Fine arts majors and Master of Fine Arts candidates should elect six semester hours of cre

fee each semester: $12 for 3 semester hours; $24 for 6 semester hours. (Academic year)

*131–32 **Ceramics II** (3 or 6–3 or 6) Özdogan, Corcoran Faculty

Development of techniques with emphasis on quality and creativity. Laboratory fee each semester: $45 for 3 semester hours; $60 for 6 semester hours. (Academic year)

133 **Ceramic Decoration** (3)

Laboratory fee, $45.

134 **History of Photography** (3) Staff
(Spring)

135–36 **Advanced Water Color** (3–3) Corcoran Faculty

Development of techniques of water color; concentration on special projects. (Academic year)

137 **Workshop in Materials, Methods, and Techniques** (3) Woodward

Drawings in charcoal, crayon, and pen; painting and preparation of grounds for tempera, encaustic, fresco buono, oil, water color, polymer, and mixed techniques; graphic techniques in woodcut, engraving, etching. Material and model fee, $10. (Fall and spring)

138 **Graphics: History and Practice** (3) Griffith

Laboratory fee, $15.

139 **Fiber and Textile Workshop** (3) Dorner

141 **Interior Design** (3) Teller and Staff

142 **House Planning** (3) Staff

143–44 **Serigraphy** (3–3) Teller

Advanced problems in serigraphy; emphasis on its aesthetic possibilities. Prerequisite: Art 57–58. Laboratory Fee, $15 a semester. (Academic year)

*151–52 **Ceramics III** (3 or 6–3 or 6) Özdogan, Corcoran Faculty

Development of techniques with emphasis on quality and creativity. Students mix own clay and glazes. Laboratory fee each semester: $45 for 3 semester hours; $60 for 6 semester hours. (Academic year)

*153–54 **Graphics II** (3 or 6–3 or 6) Griffith, Wright

Advanced relief, intaglio, and other composite processes. Prerequisite: Art 57–58. Material fee each semester: $20 for 3 semester hours; $40 for 6 semester hours. (Academic year)

*157–58 **Graphics III** (3 or 6–3 or 6) Griffith

Exploration of combined techniques and mixed media. Prerequisite: Art 153–54. Material fee each semester: $20 for 3 semester hours; $40 for 6 semester hours. (Academic year)

159–60 **Drawing II** (3–3) Wright, Corcoran Faculty

Development of drawing. Individual study, application and extensions of

* Fine Art majors and Masters of Fine Arts candidates should elect 6 semester hours of credit

drawing. Material fee when taught on GWU campus, $20 a semester. (Academic year)

163–64 **Design: Visual Communication** (3–3) Corcoran Faculty
Layouts and execution in client-presentation form of various graphic design projects—brochures, bookjackets, displays, title graphics for film media, etc. Material fee, $20 a semester. (Academic year)

166 **Advanced Drawing Techniques** (3) Smith
Laboratory fee, $20.

171 **Typography I** (3) Corcoran Faculty
(*Formerly Lettering and Type Form*)
Techniques of hand lettering, traditional and contemporary. Exploration of the decorative potential in lettering. (Fall)

172 **Typography II** (3) Corcoran Faculty
(*Formerly Typography I*)
Study of type classification, recognition, and adaption. Methods of copy fitting and type reproduction processes. Typographic layout and specification. (Spring)

177–78 **Survey of Printing and Illustration** (3–3) Corcoran Faculty
Exposure of a maximum range of illustrative processes, both practical and theoretical. Technical aspects of commercial printing processes; methods of preparation of artwork, photographs, and typographic proofs for commercial reproduction. (Academic year)

*179–80 **Sculpture II** (3 or 6–3 or 6) Gates, Corcoran Faculty
Concepts of sculpture; new materials and developments. Laboratory fee each semester when taught on GWU campus; $15 for 3 semester hours; $30 for 6 semester hours. Laboratory fee each semester when taught at CSA: $30 for 3 semester hours; $45 for 6 semester hours. (Academic year)

181–82 **Intermediate Photography** (3–3) Lake
Basic problems. Introduction to color photography with emphasis on creative expression. Prerequisite: Art 23–24 or permission of instructor. Laboratory fee, $35 a semester. (Academic year)

183 **Intermediate Black and White Photography** (3) Corcoran Faculty
Emphasis on role of ideas in black and white photography. Critiques designed to encourage development of an individual style. Prerequisite: Art 23—24 or permission of instructor. Laboratory fee, $30. (Fall and spring)

185–86 **Painting and Drawing** (3–3) Corcoran Faculty
Techniques of drawing and painting in oil, acrylic, and water color. Work from life model and still life. Not offered academic year 1976-77.

*189–90 **Sculpture III** (3 or 6–3 or 6) Gates
Advanced study concentrating on relevance of scale and media. Relationship of sculpture to the environment. Laboratory fee for each semester: $15 for 3 semester hours; $30 for 6 semester hours. (Academic year)

* Fine arts majors and Masters of Fine Arts candidates should elect 6 semester hours of credit

193–94 **Film Making** (3–3) Corcoran Faculty

Basic techniques and procedures in film making. Each student will create a short film. Art 193 is prerequisite for Art 194. (Academic year)

*195 **Documentary Photography** (3) Lake and Staff

Social problems, team-taught. Each student will work on projects with social dimensions. Laboratory fee, $35. Admission by permission of instructor. Limited enrollment. (Spring)

197–98 **History of Photography** (3–3) Corcoran Faculty

Discussion, with slides of major figures and movements in the history of photography. Not offered academic year 1976-77.

Third Group

All third-group Art courses may be repeated for credit with the approval of the Department.

205 **Advanced Photography** (3) Lake, Corcoran Faculty

Advanced problems in photography; emphasis on individual development. Prerequisite: Art 181–82 or permission of instructor. Laboratory fee, $35 a semester. (Fall and spring)

206 **Photography: Special Projects** (3) Lake

Laboratory fee, $35.

208 **Advanced Photography** (3) Corcoran Faculty

Advanced problems in photography; emphasis on individual development. Prerequisite: Art 181–82 or permission of instructor. Laboratory fee, $30. (Fall and spring)

209–10 **Exhibition and Display Design** (3–3

224 **Ceramic Sculpture** (3)

Laboratory fee, $45.

225 **Ceramic Restoration** (3)

Laboratory fee, $45.

226 **Architectural Ceramics** (3)

Laboratory fee, $45.

†231–32 **Design III** (3 or 6–3 or 6) Gates

New media and techniques in three-dimensional design. Laboratory fee, $15 a semester for 3 semester hours; $30 a semester for 6 semester hours. (Academic year)

†234 **Design IV** (3 or 6) Staff

Presentation, model building, and specifications of materials in three-dimensional problems. (Fall and spring)

†235 **Design V** (3 or 6) Teller

Designing and executing textiles using the techniques of silk screen, block print, and batik. (Fall and spring)

* Interdepartmental course offered by the departments of art and journalism.
† Fine arts majors and Master of Fine Arts candidates should elect six semester hours of credit.

248 **Independent Research in Fine Arts** (3)

For Master's degree candidates; open to limited number of qualified undergraduates, with permission. Independent research arranged in consultation with individual instructor and graduate adviser. May be repeated for credit. (Fall and spring)

249 **Theory of Design** (3) Teller

Application of design principles to painting, architecture, sculpture, and minor arts of today. Relationship of design principles to contemporary artists and their works. Open to undergraduate students with permission of instructor. (Fall)

*251–52 **Ceramics IV** (3 or 6–3 or 6) Özdogan, Corcoran Faculty

Development of techniques with emphasis on quality and creativity. Students mix own clay and glazes. Laboratory fee each semester: $45 for 3 semester hours; $60 for 6 semester hours. (Academic year)

*253 **Ceramics V** (3 or 6) Özdogan, Corcoran Faculty

Laboratory fee: $45 for 3 semester hours; $60 for 6 semester hours. (Fall and spring)

254 **Ceramic Glazes: Calculation and Formulation** (3) Glassman

*255–56 **Graphics IV: Serigraphy** (3 or 6–3 or 6) Teller

Prerequisite: Art 157–58. Laboratory fee each semester: $15 for 3 semester hours; $30 for 6 semester hours. (Academic year)

*257–58 **Graphics V: Etching and Engraving** (3 or 6–3 or 6) Griffith

Prerequisite: Art 157–58. Material fee each semester: $20 for 3 semester hours; $40 for 6 semester hours. (Academic year)

*259 **Graphics VI: Lithography** (3 or 6) Wright

(Fall and spring)

*260 **Graphics VII: Relief Printing** (3 or 6) Griffith (Fall and spring)

Material fee: $20 for 3 semester hours; $40 for 6 semester hours.

*265–66 **Painting IV** (3 or 6–3 or 6) Woodward

Creative painting; students work on independent projects as well as assigned problems. Material and model fee each semester: $12 for 3 semester hours; $24 for 6 semester hours. (Academic year)

267–68 **Individual Problems in Photography** (3–3) Lake and Staff

Instruction and professional guidance relevant to individual projects. Laboratory fee, $35 a semester. Prerequisite: Permission of instructor. (Academic year)

*275 **Painting V** (3 or 6) Woodward

(Fall or spring)

277–78 **Design: Advanced Visual Communication** (6–6) Corcoran Faculty

Design and execution of graphic design projects, including magazine

* Fine arts majors and Master of Fine Arts candidates should elect 6 semester hours of credit.

spreads, posters, advertisements, trademarks, letterheads, packages. Psychological and symbolic aspects of design solutions. Laboratory fee, $30 each semester. (Academic year)

*279–80 **Sculpture IV** (3 or 6–3 or 6) Gates

Laboratory fee each semester: $15 for 3 semester hours; $30 for 6 semester hours. (Academic year)

*281 **Sculpture V** (3 or 6) Gates

Laboratory fee: $15 for 3 semester hours; $30 for 6 semester hours. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

Fourth Group

Limited to art history doctoral candidates. Offered as the demand requires.

363–64 **Research Problems** (3–3)

To be arranged with specific institutions, such as National Collection of Fine Arts, Corcoran Gallery, Phillips Gallery, etc. Research is directed to the study of original art works, utilizing staff, documents, and other resources at the respective institutions. May be repeated for credit.

385–86 **Readings in Art History** (3–3)

398 **Advanced Reading and Research** (arr.)

For students preparing for the doctoral examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

May be repeated for credit.

Art Therapy—Graduate Study

Professor B.I. Levy (*Program Director*)
Adjunct Assistant Professors H.Y.L. Kwiatkowska, E. Ulman (*Coordinator of Training*)
Assistant Professorial Lecturers E. Kramer, M.P. Lachman-Chapin
Clinical Instructors G. Powell, C. Wang, B.J. Clifford, E. Donnellan, S. Fishman, L. Gantt, G. Haugan, D. Mindlin, R. Wolff

Master of Arts in the field of Art Therapy.—Prerequisite: a bachelor's degree, evidence of significant training and/or experience in the arts, including painting, drawing, and clay modeling; course work in the behavioral and/or social sciences, including personality theory, abnormal psychology, and child psychology.

Required: the general requirements, pages 95–102. Prospective candidates should consult the brochure which describes the program for specific requirements.

Fields of Emphasis: adult art therapy, family art therapy, child art therapy, and research.

For the majors and Master of Fine Arts candidates should elect six semester hours of credit

THIRD GROUP

201 **Introduction to Art Therapy** (3) Ulman

Lectures, presentation of illustrative case material, class discussion of assigned readings. Survey covering range of art therapy practice, diagnostic and treatment approaches, historical development, main theoretical trends. Open only to degree candidates. (Fall)

202 **Case Studies in Art Therapy** (3) Ulman

Discussion of case material provided by students in order to refine methods of working, improve written and oral reports. Instructor and other practitioners may provide supplementary illustrative material. Assigned reading. (Spring)

203 **Technique of Art Therapy** (3) Kwiatkowska

Art therapy approaches with individuals and groups of different diagnostic categories in various settings presented through illustrative clinical examples. Students experiment with numerous techniques through the use of art materials. Open only to degree candidates. (Fall)

204 **The Freudian Model in Art Therapy** (3)
Kramer, Kwiatkowska, Ulman

Concepts of instinctual drives; ego development; defense mechanisms; sublimation; transference and countertransference; maturation and regression applied to work with children, adults, families, and groups. (Spring)

205–6 **Family Art Techniques** (3–3) Kwiatkowska

(*Formerly Family Art Therapy*)

Principles of family art therapy as adjunctive and primary treatment; art techniques for evaluation of family dynamics. Students participate in working with families. (Academic year)

207–8 **Art as Therapy with Children** (3–3) Kramer

Lectures, presentation of case material, studio work, class discussion of assigned reading. Special considerations of work in art therapy with children will be explored from the theoretical and practical standpoints. (Academic year)

211 **Survey of Art Therapy** (3) Lachman-Chapin

History, theories, range of practice in art therapy. Illustrated lectures, reading, discussion, studio work. For students not intending to specialize in Art Therapy. Open to advanced undergraduates with permission of instructor. (Fall and spring)

218 **Seminar: Systems of Psychotherapy** (3) Silver

Introduction to theory and technique of psychotherapeutic approaches: psychoanalytic, ego-centered, nondirective, transactional, and others. Original source surveyed. Open to advanced students with permission of instructor. (Spring)

275 **Group Art Therapy** (3) Staff

Contribution of art to group process through experience as a member of an art therapy group. Restricted to selected master's degree candidates with permission of instructor. Prerequisite: a minimum of six semester hours of graduate coursework in art therapy. (Fall and spring)

283–84 **Practicum in Art Therapy** (3–3) Staff

Field experience. On-the-job supervision supplemented by group supervision from the art therapy staff. Prerequisite: ArTh 201 and 203. Consult with adviser before registration.

285 **Special Projects in Art Therapy** (3) Staff

Individual work based on study, research, or practice. Details to be worked out with each student. Resource people may be called upon to assist, as appropriate. May be repeated for credit with approval of adviser.

290–91 **Workshops in Art Therapy** (3–3) Staff

(Formerly Special Projects in Art Therapy)

Art therapists and other mental health professionals will conduct four 7-hour weekend workshops during each semester. Emphasis on the elucidation of concepts of treatment through lecture, discussion, and participation. Students registered in the Art Therapy Program will aid in selection of subjects and leaders. (Academic year)

Astronomy

See "Physics."

Biochemistry

Professors C.R. Treadwell (*Chairman*), B.W. Smith, G.V. Vahouny, J.M. Bailey, H. Hess
Associate Professor G.A. Walker
Assistant Professor L.L. Gallo

Master of Science in the field of Biochemistry.—Prerequisite: a bachelor's degree. The undergraduate program must have included the following courses, or equivalent: Biol 11–12, Chem 11–12, 22, 151–52, 153–54; Phys 1, 2.

Required: the general requirements, pages 95–102, including Bioc 221–22, 227, 295–300. The remaining courses are to be selected from Bioc 224, 232, 241, 262, 295, or, with the approval of the adviser, from graduate courses in chemistry, microbiology, physiology or pharmacology. It is usually not possible to arrange courses and research so that the student can be assured of completing all of the required work in one academic year.

Doctor of Philosophy in the field of Biochemistry.—Required: the general requirements, pages 95–97, 102–104.

Research fields: Amino Acid Metabolism; Animal Nutrition; Biochemical Evolution; Biochemistry of Cancer; Biochemistry of Tissue Culture; Carbohydrate Metabolism; Chemistry and Metabolism of Carbohydrates, Lipids, Proteins; Complex Lipids; Endocrinology; Intermediary Metabolism; Lipids; Metabolic Relationships of Insulin; Metabolism; Metabolism of Connective Tissue; Metabolism of Purines and Pyrimidines; Neurochemistry; Nutrition; Protein Biosynthesis; Protein Metabolism; Tissue Respiration; and Vitamins.

221–22 **General Biochemistry** (3 or 4–4 or 5) Vahouny, Gallo, and Staff

A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Generally, graduate students *must* register for Bioc 221, 4 semester hours; Bioc 222, 5 semester hours. However, graduate students taking Bioc 225–26, ForS 281–82, Micr 241–42 or Phys 223–24 may register for Bioc 221–22 without the laboratory. With specific recommendations by the undergraduate adviser and the Department, undergraduate students may register for Bioc 221, 3 semester hours; Bioc 222, 4 semester hours. Prerequisite: Chem 152, 154. Material fee (graduate students only), $20 a semester. (Academic year)

224 **Biochemistry of Enzymes** (1) E. Anderson

Course content alternates each year between biochemistry of enzymes and enzyme reactions. Students may register for the course in consecutive years and thereby cover the entire content. Prerequisite: Bioc 221. (Fall)

*225–26 **Biomedical Instrumentation** (4–4) Smith and Staff

(Formerly Bioc 225 Biochemistry Procedures [3])

Same as ForS 281–82, Micr 241–42 and Phys 223–24. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification and quantification of materials of interest to biomedical and forensic scientists. Laboratory fee, $50. (Academic year)

227 **Biochemistry Seminar** (1) Bailey

Current literature in biochemistry. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

232 **Proteins and Amino Acids I** (1) Steers

Prerequisite: Bioc 221. (Fall)

233 **Proteins and Amino Acids II** (1) Steers, Schechter

Continuation of Bioc 232. Methods for the study of protein confirmation; determination of active sites of enzymes; mechanisms of reactions at the active site. (Spring)

241 **Isotopes** (3) Burt

Theoretical characterization of isotopes and their application in biology and medicine. Attention given to counting, health physics and radiation safety, autoradiography, chromatography. Laboratory fee, $16. (Spring)

251 **Carbohydrate Metabolism** (1) Staff

Prerequisite: Bioc 222. (Spring, even years)

252 **Biochemistry of the Brain** (1) Staff

For medical students; open to limited number of graduate students. Recent biochemical developments in structure, functions, and metabolic processes unique to the brain. (Spring)

* An interdisciplinary course offered by the departments of biochemistry, forensic sciences, microbiology and physiology

254 **Human Nutrition** (1)

For medical students; open to limited number of graduate students. Application of nutritional principles in humans. (Spring)

256 **Biochemistry of Organ Function** (1) N. Kramer*

For medical students; open to limited number of graduate students. Emphasis on biochemical processes unique to particular organ systems; application of these processes to evaluation of function. (Spring)

260 **Biochemistry of the Steriods** (1) O. Dodek†

For medical students; open to limited number of graduate students. Basic chemistry of the steroids, pathways of biosynthesis and metabolism, regulatory mechanisms, physiologic effects, clinical measurements of endogenous steroids, clinical manifestations of steroid imbalance, steroid changes in pregnancy, and steroid therapy. (Spring)

262 **Biochemistry of the Lipids** (1) Vahouny

Discussion of topics of current interest, including digestion, energy production, biosynthesis, function in specialized tissues, and subcellular particles. Content differs each time course is offered; may be repeated for credit. (Spring)

266 **Biochemical Genetics and Inherited Metabolic Diseases** (1) C. Merril

For medical students; open to limited number of graduate students. Biochemical aspects of genetics and contributions of molecular biology to understanding of human mutations and hereditary diseases. (Spring)

268 **Biochemistry of Bone and Muscle** (1) Walker

Study of structure, chemistry, and biochemistry as they relate to the normal and diseased states of bone and muscle; emphasis on current theories and techniques. (Spring)

295 **Research in Biochemistry** (arr.) Staff

Participation in a project under investigation in the Department or one in a related field suggested by the student and approved by the Staff. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

* [illegible] Associate Professor of Medicine in the School of Medicine and Health Sciences
† [illegible] Assistant Clinical Professor of Obstetrics and Gynecology in the School of Medicine and Health Sciences

Biological Sciences

Professors A.H. Desmond (*Chairman*), R.L. Weintraub, K.F. Parker
Adjunct Professors T.E. Bowman, M.L. Jones, I.S. Kornicker, H.V. Re
F.A. Chace, Jr., R. Manning, C.G. McWright
Professorial Lecturers K.C. Kates, R.S. Sigafoos, W.A. Shropshire, Jr.
Associate Professors S.O. Schiff, D.L. Atkins, R.E. Knowlton, H. Merch
R.K. Packer
Adjunct Associate Professors W.D. Hope, D.L. Pawson, J. Rosewater,
Roper, M. Rice
Associate Professorial Lecturers P.E. Spiegler, J.C.C. Dickens, B.M. T
lake
Assistant Professors T.L. Hufford, S.J. Smith-Gill
Assistant Professorial Lecturer D.A. Houston
Lecturers A.M.S. Rosenkranz, N.B.P. Sweely, L.R. Townsend

Bachelor of Arts or Bachelor of Science with a major in Biology, Bota Zoology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students sho consult the departmental adviser regarding courses to be taken in satisfying the quirement for "meaningful initiation" into the Social Studies and the Humaniti
2. Prerequisite courses—BiSc 11–12, or equivalent.
3. Required courses in related areas—Chem 11–12; Chem 151–52 and 153–5 50. (The following courses are strongly recommended: Math 31; Phys 1, 2 years of French, German, or Russian; Stat 91.)
4. (a) Required courses for the major in biology—a minimum of 24 se hours of second-group courses, which should include at least 6 hours in B 6 in botany, and 6 in zoology.

(b) Required courses for the major in botany—a minimum of 24 se hours of second-group courses in botany or a combination of botany and bi

(c) Required courses for the major in zoology—a minimum of 24 se hours of second-group courses in zoology or biology.

Master of Science in the field of Biology, Botany, or Zoology.—Prerequisite bachelor's degree with a major in one of the following from this University equivalent degree: (1) *Biology field*—an undergraduate major in biology, or zoology; (2) *Botany field*—an undergraduate major in botany or biolog *Zoology field*—an undergraduate major in zoology or biology. The undergr program must have included the following courses, or equivalent: Chem 151–5 153–54, or 50; Math 31; Phys 1, 2.

Required the general requirements, pages 95–102. The minimum requirem sists of 24 semester hours of approved course work plus a thesis (equivalen semester hours). With the permission of the department a student may ch program of study consisting of 36 semester hours of approved course work w a thesis.

Doctor of Philosophy in the field of Biology, Botany or Zoology.—Required general requirements, pages 95–97, 102–104, plus satisfactory completion of t liminary Examination and the General Examination in four areas of biolog program of study, fields of study and tool subjects are determined in consu with an advisory committee appointed for each candidate.

Research fields in Biology: cell physiology, cytogenetics, cytology, develop genetics and molecular genetics.

Research fields in Botany: photobiology, phycology, plant ecology, plan ology (microorganisms), plant physiology (vascular plants) and taxonomy.

Research fields in Zoology: animal ecology; bioenergetics; comparative neuroanatomy; comparative physiology; herpetology; histophysiology; invertebrate zoology; marine biology; radiation biology; taxonomy, anatomy and physiology of mollusks; vertebrate anatomy and taxonomy; vertebrate embryology and morphogenesis; vertebrate ichthyology; and vertebrate physiology.

Bachelor of Arts in Education with a teaching field in Biology.—Prerequisite: the education curriculum, pages 81–82.

Required: the biology option and the professional courses listed on pages 118, 126.

Departmental prerequisite: BiSc 11–12 or equivalent is prerequisite to all second-group courses in biology, botany and zoology, except by permission of the instructor.

BIOLOGY

First Group

3–4 **Introductory Biology for Nonscience Majors** (3–3) Schiff

Lecture (2 hours), laboratory (2 hours). Survey of biological principles; emphasis on man as a functional organism in the environment. Prerequisite to BiSc 4: BiSc 3. Material fee, $15 a semester. (Academic year)

11–12 **Introductory Biology for Science Majors** (4–4) Merchant

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Prerequisite to BiSc 12: BiSc 11. Material fee, $18 a semester. (Academic year)

*26 **Environmental Issues** (3) Langran, Schiff

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Fall and spring)

Second Group

103 **Marine Biology** (4) Knowlton

Lecture (2 hours), laboratory and field (3 hours), plus some extended field trips. Study of relationships between organisms and physical, chemical, and biological factors of the marine environment. Consideration of the open ocean and coastal eco-systems and man's influence on them. Recommended prerequisite: BiSc 101 or 102, 106, 140. Material fee, $20. (Spring)

108 **Organic Evolution** (3) Staff

Synthetic theory of organic evolution including treatment of speciation, adaptive radiation, biogeography, population biology, sociality, and human evolution. (Spring)

*Offered jointly by the Division of Experimental Programs and the departments of biological sciences and geography and regional science.

111 **Introductory Microbiology** (4) Weintraub

Lecture (2 hours), laboratory (4 hours). Survey of the major groups of microorganisms with emphasis on structure, physiology, ecology, phylogenetic relationships, and economic importance. Prerequisite: one year of chemistry. Material fee, $20. (Fall and spring)

115 **Cytology** (4) Schiff

Lecture (2 hours), laboratory (4 hours). Structure and function of cells; analysis of chromosomes; cytological techniques and preparation of slides. Recommended: one year of chemistry. Material fee, $18.

118 **Advanced Cytology** (3) Schiff

Lecture (1 hour), laboratory (4 hours). Mechanisms of cell action. Laboratory consists of a project to be selected by the student with concurrence of the instructor. Prerequisite: BiSc 115. Material fee, $20.

122 **Cell Biology I: Molecular and Subcellular Biology** (3) Weintraub

Structure and function of biological molecules, viruses, and cellular organelles. Prerequisite: one semester of organic chemistry. (Fall)

123 **Cell Biology II: Cell Biochemistry** (3) Weintraub

Introduction to the metabolism of generalized cells of animals, plants, and microorganisms, including energetics, enzymes, respiration, biosynthesis and regulatory mechanisms. Prerequisite: one semester of organic chemistry. (Spring, even years)

124 **Cell Biology II: Cell Biochemistry Laboratory** (1) Weintraub

Designed to illustrate some of the principles and techniques of biochemical experimentation. Prerequisite or concurrent registration: BiSc 123. Material fee, $24. (Spring, even years)

127 **Genetics** (3) Staff

Introductory course. Basic aspects of transmission of genetic traits with particular reference to the chemical basis of heredity and gene action. (Fall and spring)

128 **Genetics Laboratory** (1) Staff

Study of genetic principles using Drosophila, *E. coli*, and lambda phage. Prerequisite or concurrent registration: BiSc 127. Material fee, $20. (Fall and spring)

129 **Cell Biology III: Cell Physiology** (3) Weintraub

Study of cell processes, including growth, division, differentiation, interactions, aging, movements, energy perception and transduction, luminescence. (Spring, odd years)

130 **Cell Biology III: Cell Physiology Laboratory** (1) Weintraub

Exercises to illustrate some principles and techniques. Prerequisite or concurrent registration: BiSc 129. Material fee, $24. (Spring, odd years)

138 **Advanced Genetics** (3) Staff

Emphasis on the use of genetic analysis in solving modern biological problems. Prerequisite: introductory course in genetics. (Spring)

167 **Radiation Biology** (3) Schiff

Chemical, physical, and biological aspects of radiation; effects of radiation on cells and organisms, with emphasis on mammals; genetic effects. Recommended: two years of biological sciences, and chemistry or physics. (Fall)

171 **Undergraduate Research** (arr.) Staff

Admission by permission of the staff member concerned. May be repeated for credit. Prerequisite: Chem 50 or 152; 16 semester hours in Biological Science courses. Material fee, $20 per semester hour. (Fall and spring)

172 **Independent Study in Cell and Molecular Biology** (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

173 **Independent Study in Developmental Biology** (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

174 **Independent Study in Organismic Biology** (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

175 **Independent Study in Genetic and Evolutionary Biology** (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

176 **Independent Study in Environmental Biology** (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

177 **Laboratory Techniques, Instrumentation, and Data Analysis** (3) Staff

Theory and practice in experimental design; techniques and instrumentation used in biological research laboratories.

181–82 **Senior Seminar** (1–1) Staff

Lectures and discussions on current biological problems. (Academic year)

185 **Human Nutrition** (3) Weintraub

Dietary requirements and their underlying physiological and biochemical bases; composition of natural and modified foodstuffs and additives; social and economic aspects of nutrition. (Fall)

Third Group

206 **Seminar: Radiation Biology** (3) Schiff

Actions of radiation at subcellular, cellular, and organismal levels; factors modifying radiation damage; practical considerations in radiation exposure. Prerequisite: BiSc 167 or equivalent. (Spring)

207 **Seminar: Origin of Life** (3) Weintra
Review of experiments and speculations concerning origin of life and molecular aspects of biological evolution (Spring, odd years)

208 **Seminar in Bioenergetics** (3) Merchan
Study of energy fixation and transfer in ecosystems. (Spring 1976 and alternate springs)

209 **Seminar: Principles and Mechanisms of Organic Evolution** (3) Staff
Principles and mechanisms of evolution in animals and plants; population phenomena, speciation, and evolution above the species level. (Fa 1976 and alternate falls)

220 **Seminar: Cell Physiology** (3) Shropsh
Review in depth of selected topics. May be repeated for credit. (Fall)

222 **Seminar: Topics in Molecular Biology** (3) Weintra
(Spring, even years)

227 **Seminar: Genetics** (3) Staff
Current problems in genetics. Students are required to present one semi- nar covering the full class period. May be repeated for credit. (Fa Staff

228 **Population Genetics** (3)
Consequences of medelian inheritance on the population level as exemp fied by gene frequencies, random mating, inbreeding, differential fertili and mutation. Staff

229 **Cytogenetics** (3)
Behavior of chromosomes in mitosis and meisosis as a basis for the trans mission of genes from one generation to the next through reproduc and the influence of cytogenetic processes on the mechanisms of evolutio

230 **Understanding Environmental Issues—Water Pollution** (6) Hufford and St
Methods and techniques used in determining water quality; engineering and technological skills currently utilized or available for use in dea with a variety of water quality aspects; attitudes and approaches of p social scientists; practical aspects of implementing water-quality progra Preparation of secondary school curricula.

248 **Analysis of Development** (3) Smith-
Survey of current research in experimental morphology, developmen genetics, biochemical development and developmental endocrinology. Pr requisite: BiSc 146 or equivalent. (Spring, even years)

249 **Seminar: Developmental Biology** (3) Smith-C
Discussion and reports on current literature in developmental biology with emphasis on developmental genetics. Prerequisite: at least one cour each in developmental biology and genetics. (Spring, odd years)

255 **Seminar: Consortium Biology** (2)
Topic to be announced in *Schedule of Classes*. (Spring)

295 **Research** (arr.) Staff
Investigation of special problems. May be repeated for credit. (Fall and spring)

399–300 **Thesis Research** (3–3) Staff
(Fall and spring)

arth Group

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

TANY

oad Group

105 **Local Flora** (4) Parker
Lecture (2 hours), laboratory and field (4 hours). Field and laboratory studies on local flora; emphasis on the woody plants. Material fee, $18. (Fall)

106 **Field Botany—Lower Plants** (4) Hufford
Lecture (2 hours), laboratory and field (4 hours). Primarily for non-specialists, emphasizing algae, mosses, and ferns. Material fee, $18. (Spring)

109 **Developmental Plant Anatomy** (4) Hufford
Demonstration, observation, discussion (6 hours). Initiation and ontogeny of tissues and organs of vascular plants. Material fee, $18. (Spring, odd years)

110 **Comparative Plant Morphology** (4) Hufford
Demonstration, observation, discussion (6 hours). Evolutionary morphology and life histories as a basis for a phylogenetic study and the critical roles plants have in human welfare. Material fee, $18. (Fall, even years)

125 **Flowering Plants** (4) Parker
Lecture (2 hours), laboratory and field (4 hours). Origin, evolutionary development, and principles of systematics of flowering plants. Material fee, $18. (Spring)

132 **Mycology** (4) Staff
Lecture (2 hours), laboratory (3 hours). Material fee, $18. (Spring)

133 **Plants, Man, and Life** (3) Hufford
Plants by which man lives and upon which he depends for his food,

shelter, medicine, clothing, and industries, as well as his drugs and drinks. (Spring)

134 **Plant Pathology** (4)
Lecture (2 hours), laboratory (3 hours). Material fee, $18.

135 **Plant Physiology** (4)
Lecture (2 hours), laboratory (4 hours). Physiology of seed plants with emphasis on growth, development, tropisms, and reproduction. Prerequisite: Chem 11–12. Recommended: Chem 50 or 151–52. Material fee, $24. (Fall, odd years)

137 **Horticulture** (4)
Lecture (2 hours), laboratory (4 hours). Basic principles of growth, propagation, and care of ornamental plants. Material fee, $18. (Fall and spring)

141 **Plant Ecology** (4)
Lecture (2 hours), laboratory (4 hours). Prerequisite: BiSc 105, 125 and 3 hours of geology. Several Saturday and weekend fieldtrips required. Material fee, $18. (Fall, even years)

149 **Freshwater Algae** (4)
Observation and discussion (6 hours). Systematics, morphology, and physiology of freshwater groups of algae. Ecological interrelationships, growth habit, and importance to man. Field experience, including at least one weekend field trip. Material fee, $18. (Fall, odd years)

150 **Freshwater Diatoms** (4)
Observation and discussion (6 hours). Taxonomy, morphology, and ecology of freshwater diatoms. Critical light microscopy, SEM microscopy, and role of diatoms in water quality studies, and their importance to man. Field experience. Material fee, $18. (Spring, even years)

Third Group

221 **Seminar: Systematics** (3)
Review of current work in various disciplines of systematic research of special interest to participants. May be repeated for credit. (Fall, odd years)

235 **Seminar: Plant Physiology** (3)

237 **Seminar: Water Pollution Biology** (3)
Review of current research in water quality and water pollution biology. (Fall, even years)

238 **Seminar: Current Topics in Phycology** (3)
(Spring, odd years)

242 **Seminar: Plant Ecology** (3)
(Fall, odd years)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

OLOGY

ead Group

101 **Invertebrate Zoology** (4) Knowlton
Lecture (2 hours), laboratory (4 hours). General survey of invertebrate animals, including classification, morphology, physiology, embryology, and evolutionary relationships among phyla. Material fee, $20. (Fall)

102 **Advanced Invertebrate Zoology** (4) Knowlton
Lecture (2 hours), laboratory and field (4 hours). Study of invertebrate systems (cells, tissues, organs, organisms), with emphasis on functional aspects (physiology and ecology) and taxonomy of important groups. Prerequisite: BiSc 101 or equivalent. Material fee, $20. (Spring)

104 **Comparative Vertebrate Anatomy** (4) Atkins
Lecture (2 hours), laboratory (4 hours). Evolution and comparative morphology of chordata, stressing recent forms. Material fee, $20.
(Fall and spring)

140 **General Ecology** (4) Merchant
Lecture (3 hours), laboratory and field (3 hours). Introduction to the concepts of limiting factors, biogeochemical cycles, trophic levels, and energy transfer, and their relationship to the structure and function of population, species, communities, and ecosystems. Material fee, $20.
(Fall)

143 **Animal Ecology** (4) Merchant
Lecture (3 hours), laboratory and field (3 hours). Application of ecological principles to the understanding and manipulation of animal populations. Prerequisite: BiSc 140 or permission of instructor. Laboratory fee, $20. (Spring, even years)

144 **Aquatic Ecology** (4) Merchant
Lecture (3 hours), laboratory and field (3 hours). Principles applied to aquatic systems with special references to physicochemical properties, typical habitats and communities. Prerequisite: BiSc 143 or permission of instructor. Laboratory fee, $20. (Spring, odd years)

145 **Introduction to Vertebrate Embryology** (4) Smith-Gill
Lecture (2 hours), laboratory (4 hours). Origin and early development of the individual, formation of organ systems. Emphasis on frog, chick, and pig, with reference to human embryo. Material fee, $20. (Fall)

146 **Experimental Developmental Biology** (4) Smith-Gill
Lecture (2 hours), laboratory (4 hours). Introduction to the experimental, biochemical, and genetic analysis of developing systems through examination of the literature and laboratory experiments. Prerequisite: BiSc 145 or equivalent, or permission of instructor. Recommended: a course in cell biology or genetics and Chem 50 or 151–52. Laboratory fee, $24. (Spring)

148 **Histology** (4)

Lecture (2 hours), laboratory (4 hours). Introduction to microscopic anatomy of normal tissues and organs with emphasis on the interrel tionship of structure and function. Material fee, $20. (Fall and spring

152 **Protozoa** (4)

Lecture (2 hours), laboratory (4 hours). Introduction to protozoa: cla sification, life histories, genetics, and physiology; emphasis on free-livi types. Material fee, $20. (Spring, even years)

153 **Survey of Neurobiology** (4)

Lecture (2 hours), laboratory (3 hours). Study of the gross and cellu anatomy, physiology, and biochemistry of the nervous system; empha on mammals. Prerequisite: BiSc 104. Material fee, $24. (Spring, o years)

154 **Vertebrate Zoology** (4)

Lecture and discussion (2 hours), laboratory and field (4 hours). Ver brate natural history and systematics, emphasizing higher and transitio taxa. Prerequisite: BiSc 104. Material fee, $20. (Spring, even year

155 **Parasitology** (4)

Lecture (2 hours), laboratory (4 hours). Introduction to animal para tology; survey of parasitic types from protozoa through arthropods. M terial fee, $20. (Fall, even years)

156 **Ichthyology** (4)

General biology of fishes, including structure, function, distribution evolution, with emphasis on adaptations. Prerequisite: background comparative anatomy and vertebrate zoology, or permission of instruc (Spring)

157 **Comparative Endocrinology** (3)

Comparative study of basic principles of chemical integration, neuro docrine relationships, and mechanisms of hormone action. Prerequ BiSc 104, 165 and/or concurrent registration in Chem 151–52 or Chem (Spring)

161 **Entomology** (4)

Lecture (2 hours), laboratory (4 hours). The biology of insects, inc ing their morphology, physiology, development, behavior, and ecol Material fee, $20. (Fall)

162 **Insect Evolution** (4)

Lecture (2 hours), laboratory (4 hours). Adaptive radiation of inse emphasis on insect-plant relationships, behavior, and paleontology. requisite: BiSc 161. Material fee, $20. (Spring)

163 **Human Physiology** (3)

Introduction to the function of organ systems of the human body. (Fall)

164 **Human Physiology Laboratory** (1)

Study of basic physiology laboratory techniques; emphasis on the exp mental study of homeostatic mechanisms in humans. Prerequisite concurrent registration: BiSc 163. Material fee, $24. (Fall)

165 **Vertebrate Physiology** (4) Packer

Lecture (3 hours), laboratory (3 hours). Detailed study of selected organ systems, stressing chemical and physical bases. Prerequisite: BiSc 163 and 164, or equivalent. Prerequisite or concurrent registration: Chem 151–52 or 50. Material fee, $24. (Spring)

Third Group

204 **Seminar: Invertebrate Zoology** (3) Knowlton

Review of selective topics in physiology, development, and ecology of invertebrate animals, including reports on original publications. May be repeated for credit. (Fall)

*205 **Comparative Pathology** (3) Zook

An introduction to the study of disease and disease mechanisms in vertebrates, and comparison with disease in man. Recommended: courses in anatomy, histology, and physiology. (Fall)

210 **Animal Behavior** (3) Staff

Principles of animal behavior, including mechanisms and manifestations from simple reflex systems to social interaction. (Spring, even years)

211 **The Social Insects** (3) Staff

Morphology, behavior, and classification of the social insects; emphasis on comparison of colonial organization of major groups. (Spring, odd years)

244 **Histophysiology** (3) Desmond

Study of current publications in the field of histophysiology. (Fall)

245 **Histochemistry** (3) Desmond

Theory and application of chemical techniques in determining changes in the amount and distribution of inorganic and organic constituents of tissues during different physiological and pathological conditions. (Spring)

252 **Seminar: Neurobiology** (3) Atkins

Study of current publications in comparative neurobiology. (Fall, odd years)

265 **Comparative Animal Physiology** (3) Packer

Survey of the physiological basis of adaptation of animals to diverse environments, emphasis on nonmammalian vertebrates. Prerequisite: BiSc 165 or equivalent. (Fall)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

Biology

...ee "Biological Sciences."

...interdepartmental course offered by the department of biological sciences and pathology

Botany

See "Biological Sciences."

Business Administration

Professors J.L. Jessup, R.B. Eastin, E. Timbers, H.R. Page, D.D. Ron
F. Amling, G. Black (*Chairman*), P.D. Grub, R.C. Sedwick, P.M. H
(*Visiting*), G.P. Lauter, J. Zwick, N.M. Loeser
Professorial Lecturers L.C. Collins, K.F. McClure, J.P. Murphy, J.F. D
day, W.G. Torpey, B. Burdetsky, H. Brown, P.M. Dickie
Associate Professors R. Eldridge, S.F. Divita, S.N. Sherman, J.H.H. Carring
C.R. Miller, J.J. Hampton, R.F. Dyer
Associate Professorial Lecturers B. Benefield, J.R. Potter, Jr.
Assistant Professors J.M. Sachlis, H.A. Tombari
Assistant Professorial Lecturers N.R. Harbaugh L.R. Brown, S. Tesko, W
Handorf, D.P. Lohmann
Instructor C.W. Miller

Programs of study in business administration leading to the degrees of *Ba of Business Administration*, *Master of Business Administration*, and *Doctor of B ness Administration* are offered by the School of Government and Business Ad istration (see pages 138–72).

FIRST GROUP

51 **Introduction to Business** (3)

Structure, activities, and problems of business enterprise; its contribu to the individual and to society; careers in business. (Fall and spri

61 **Personal Finance** (3)

Management of personal and family income and expenses; con spending, budgeting, home buying, credit buying, borrowing, ban saving and investing, insurance and estate planning, taxation. (No fered academic year 1976–77)

SECOND GROUP

101 **The Business Environment** (3)

Economic and legal environment of business enterprise; social and p cal influences; contemporary problems and issues. (Fall and spr

102 **Fundamentals of Management** (3)

Planning, organizing, directing, coordinating, and controlling activi the administrative unit, evolution of management thinking. (Fa spring)

104 **Small Business Management** (3)

Essentials of operating a small business; required records and re resolution of day-to-day problems, sources of assistance to small

nesses. Offered primarily as a service to the business community; open to degree candidates with the approval of the instructor. (Spring)

105 **Personnel Management** (3) Staff

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities. (Fall and spring)

106 **Leadership in Personnel Management** (3) Staff

A study of the philosophy, principles, policies, and programs for effective personnel management and industrial relations as portrayed by case studies drawn from business and government. Prerequisite: BAd 105 or permission of instructor. (Fall)

107 **Collective Bargaining** (3) Staff

American unionism and collective bargaining: economic, social, and public policy considerations. The negotiation and administration of collective bargaining agreements. Prerequisite: BAd 105 or permission of instructor. (Spring)

113 **Real Estate** (3) Staff

Principles of urban real estate practice; leasing and property management, valuation, appraisal, financing, taxation, urban growth, urban renewal. (Not offered academic year 1976–77)

121 **Fundamentals of Insurance and Risk Management** (3) Staff

Function of insurance and risk management in business enterprise. (Not offered academic year 1976–77)

122 **Insurance and Estate Planning** (3) Staff

Insurance and estate programming in providing protection and estate development, disposition of the individual estate. (Not offered academic year 1976–77)

131 **Business Finance** (3) Sachlis

Analyzing capital requirements and methods of acquiring funds; planning efficient use of capital. Asset management, financial analysis, sources of funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51. (Fall and spring)

132 **International Business Finance** (3) Eldridge

Principles, practices, problems, and institutions of international finance. Emphasis on international financial markets, exchange rates, balance-of-payments restraints and governmental policies. Prerequisite: BAd 131. (Fall)

133 **Capital Formation** (3) Staff

The process of capital formation in a free enterprise economy. Roles of business firms, financial intermediaries, money and capital market institutions, governmental regulatory agencies, fiscal and monetary policies. Prerequisite: BAd 131. (Spring)

138 **Investment and Portfolio Management** (3) Amling

Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2 BAd 131 (Spring)

141 **Basic Marketing Management** (3) Dyer

Role of marketing in the socioeconomic system, consumer behavior analysis, impact of consumerism. Major decision areas of product planning pricing and distribution; tools of marketing research and demand analysis Prerequisite: Econ 1–2. (Fall and spring)

143 **Marketing Research** (3) Dyer

Basic methods and techniques of marketing research, problem definition data collection, market survey and experimental design, data analysis and presentation. Special topics: attitude research, questionnaire construction and concept testing. Prerequisite: BAd 141 (Spring)

144 **International Marketing Management** (3) Staff

Analysis of the international marketing position of the United States, channels for international marketing, international advertising media, legal aspects, foreign market surveys, development of policies. (Fall)

145 **Sales Management** (3) Staff

Organization of sales department, sales planning and forecasting, quotas, territories, performance standards, and analysis and control of distribution costs. Prerequisite: BAd 141. (Fall)

147 **Advertising** (3) Dyer

Planning an advertising campaign. Consumer and market information, message appeals, media selection and scheduling, measuring effectiveness. Current criticism and regulation of the advertising function. Other major marketing communication tools, including personal selling and sales promotion, presented. (Spring)

158 **Physical Distribution Management** (3) Staff

Logistical considerations of plant, warehouse and store location, inventory control, warehousing and transportation planning. Channels of distribution from an institutional-behavioral viewpoint. Design, management and evaluation of the distribution system. Prerequisite: Econ 1–2. (Fall)

161 **Commercial Law** (3) Collins, McClure, Mu

Fundamental concepts and principles of law encountered in business activity; contracts, bailments, agency, sales, negotiable instruments, bankruptcy, other topics. Basic legal considerations in business decision-making. (Fall and spring)

171 **Principles of Transportation** (3) Sherman

Impact of intercity transportation systems on society. Emphasis on modal differences in development, economic characteristics, and regulation. Prerequisite: Econ 1–2. (Fall)

172 **Public Utilities** (3)

Legal and economic meaning of public utility concept; development, services, economic characteristics, rate-making, and regulation with emphasis on electric, gas, and telephone industries. Prerequisite: Econ 1–2 (Fall) Pa

173 **Transportation Systems Management** (3)

Comparative study, from the standpoint of various carrier modes, of management problems common to all modes of domestic and international transportation. Prerequisite: BAd 171, Econ 1–2 (Spring)

174 **Urban Transportation** (3) **Staff**

Problems of developing balanced transportation systems for urban areas—area needs, modal evaluation, cost effectiveness, finance, and marketing. Prerequisite: BAd 171, Econ 1–2; or equivalent. (Spring)

175 **Introduction to International Business** (3) **Staff**

Terminology; trade usages and practices; physical movement of goods in international business; conditions essential for successful trading; export shipment, documentation, procedural problems. (Fall)

176 **International Business Theory and Policy** (3) Eldridge

Theoretical relationships underlying international business transactions, role of government, international agreements between private producers, trade with developing nations, policy. Prerequisite: Econ 1–2. (Spring)

178 **International Business Policy and Operations** (3) **Staff**

Analysis of overseas projects according to purpose and type of organization; development and management of overseas operations in different world areas. Prerequisite: BAd 175 or permission of instructor. (Spring)

181 **Manufacturing Production** (3) Tombari, Roman

Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from various process and fabrication industries. Prerequisite: Math 51, 52; Stat 51 or equivalent. (Fall and spring)

192 **Internship in Business Administration** (3) Carrington

Internship assignment with an extramural sponsor: a business firm, a business-related government agency, or an interest group. Open to selected juniors and seniors by permission of adviser. (Fall and spring)

198 **Business Policy and Administration** (3) Eastin, Vaill

Terminal undergraduate course in Business Administration. Integration of functional activities in arriving at over-all business policy decisions. Prerequisite: BAd 102, 105, 131, 141, 181. (Fall and spring)

199 **Individual Research** (arr.)

Assigned topics. Admission by prior permission of adviser. May be repeated once for credit. (Fall and spring)

THIRD GROUP

201 **Social Environment of Business** (3) Timbers

Contemporary social forces acting on business management: business responsibility, ethics. (Fall)

202 **Business-Government Relations** (3) Timbers

(Formerly Relations of Government to Business)

Regulatory and promotional activities of the government, independent regulatory agencies, antitrust activities, monetary and fiscal policy, regulation of labor-management relations. (Fall and spring)

203 **Legal Environment of Business** (3) Timbers

Business under the U.S. Constitution, federal legislation, legal precedents,

and agency orders. Major emphasis on court decisions relating to business. Prerequisite: BAd 202 or permission of instructor. (Spring)

204 **Legal Aspects of International and Multinational Business** (3) Staff

Legal environment of international and multinational business including legal systems, antitrust laws, regulation of direct investment, international arbitration and expropriation; topics of current interest. (Fall and spring)

208 **Personnel Management and Industrial Relations** (3) Staff

Survey of personnel management practices and procedures, including labor-management relations. (Fall and spring)

209 **Seminar: Personnel Management** (3) Eastman

Industrial personnel and manpower management, research in advanced problems. (Spring)

210 **The Personnel Manager** (3) Staff

The personnel manager and his place in the organization, relation to other executives, policy role and relations with chief executive. Problems of the senior personnel executive. Prerequisite: BAd 208 or permission of instructor.

211 **Leadership and Executive Development** (3) Loesch

Theories of managerial leadership; issues and problems associated with leadership in large organizations and at higher management levels; executive selection and development. Prerequisite: Mgt 201 or permission of instructor. (Spring)

212 **Unionism and Collective Bargaining** (3) Burdetsky

The American labor movement. Collective bargaining and the conduct of labor relations under collective bargaining agreements. (Fall)

213 **Current Issues in Unionism, Collective Bargaining, and Labor Relations** (3) Burdetsky

Current problems and issues. Prerequisite: BAd 212. (Spring)

220 **Administration of Research and Development** (3) Roman

Examination of technological, political, and economic factors affecting the R&D environment; operational aspects; management problems in military, governmental, and industrial organizations; project selection, resource allocation, personnel, planning and control, measurement and evaluation. (Fall)

222 **International Research and Development** (3) Roman

Technological, political, social, and economic factors affecting international R&D policy; problems in industrial, governmental, and international organizations; world technological forecasting; resource allocation. Technology transfer. Prerequisite: BAd 220 or permission of instructor. (Fall)

223–24 **Technology Assessment Theory and Practice** (3–3) Coats

BAd 223: the technology assessment concept. Methods for conducting assessments. Management of assessments. Evaluation of selected assess-

ments. BAd 224: planning and conducting a technology assessment. Prerequisite to BAd 224: BAd 223 or permission of instructor. (Academic year)

225 **Seminar: Manufacturing Production** (3) Tombari

Production technology, including new processes, materials, products, equipment, and facilities. Implications of emerging technology in managing the production function. Prerequisite: BAd 181 or permission of instructor. (Spring)

229 **Seminar: Administration of Research and Development** (3) Roman

Individual and/or group in-depth research projects dealing with various phases of research and development management. Topic will vary each time the course is offered according to the emerging technology, current operational problems, and student interest. Prerequisite: 6 to 9 semester hours of research and development management or permission of instructor. (Fall)

231 **Financial Decision-making** (3) Hampton, Sachlis

Functions and objectives of financial management, asset management, problems of internal financial analysis, rate-of-return analysis, financial forecasting, problems of capital demand and supply. Prerequisite: Acct 115 or equivalent, BAd 131. (Fall and spring)

232 **Capital Resource Management** (3) Hampton

Problems of capital acquisition, costs, rationing, structure; dividend policy. Prerequisite: BAd 231. (Fall and spring)

233 **International Business Finance** (3) Zwick

Analysis of problems in international business finance. Impact of the evolving international payments system on business. Prerequisite: BAd 131 or equivalent. (Fall and spring)

234 **Seminar: Capital Formation** (3) Handorf, Horvitz

Determinants of saving and investment, timing of corporate security issues, analysis of current capital market conditions. Prerequisite: BAd 131 or equivalent. (Fall and spring)

235 **Financial Management** (3) Amling

Restricted to students in the Navy Graduate Financial Management Program. Problems of financial management; planning financial structure, obtaining and managing capital, issuing and placing securities, administering income, security arrangements. Prerequisite: Acct 215, Mgt 201. (As arranged)

237 **Investment Analysis** (3) Amling

Risk-reward analysis of security investments including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: BAd 131. (Fall and spring)

238 **Seminar: Investment and Portfolio Management** (3) Amling

Portfolio management theory, application, and computer modeling. Inde-

pendent research on investment analysis and portfolio management with emphasis on theory, cases, and computer applications. Prerequisite: BAd 237. (Spring)

241 **Marketing Management** (3) Dyer, Divita

Marketing management problems; market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs. (Fall and spring)

243 **Seminar: Marketing Research** (3) Dyer

Research as an aid to decision-making and increased efficiency in marketing, marketing research process, critical appraisal of methods and results, applications. (Spring)

245 **Promotion Management/ Marketing Communications** (3) Dyer

Examination of promotion mix from a systems perspective supported by analytical methods and concepts regarding consumer attitudes and behavior. Topics: social context of promotion, role of communication in marketing, behavioral concepts and communications research, message design, economic and financial criteria, development of a promotional program. Prerequisite: BAd 241 or permission of instructor. (Spring)

246 **Consumer Behavior** (3) Dyer

Consumer decision-making in the market place; research in pertinent interdisciplinary studies in psychology, sociology, and other behavioral fields, present and potential applications for marketing. (Fall)

247 **Marketing and Public Policy** (3) Divita

(Formerly Current Issues in Marketing)

Examination of principal areas of public policy formulation affecting marketing practice. Topics: advertising, warranties, product safety, health issues, consumer information systems, informal and formal redress mechanisms, business responsibilities. Government business and advocate viewpoints presented. (Fall)

248 **International Marketing** (3) Lauter

Organization for international marketing, demand analysis, product development and policies, marketing structure and trade channels, advertising and promotion problems and policies, pricing, and legal aspects. Effective international marketing strategy. (Fall and spring)

249 **Marketing Strategy** (3) Dyer

(*Formerly Marketing Policy*)

Analysis of complex marketing problems involving policy and operating decisions; emphasis on creative marketing strategy. (Spring)

250 **Marketing to the Government** (3) Dyer

Overview of government R&D and systems markets. Government acquisition process, buyer behavior, market research, technological planning and the bid decision, field sales force management, proposals, marketing strategy, pricing strategy, product-line strategy (Fall)

253 **Distribution Logistics** (3) Staff

Problems of physical distribution and supply of goods. Role of logistics in the economy and the business firm, transportation rates and services, location theory and problems, service standards, inventory control, information flow, scheduling, allocation, warehousing, traffic, and logistics system organization. (Spring)

255 **Multinational Corporations in the World Economy** (3) Zwick, Grub

Business in the world economy; multinational corporations as economic, political, and social institutions; ownership and growth strategies, relationships to other nations; national and international controls; future of the multinational corporation. (Fall and spring)

256 **Seminar: International Trade** (3) Eldridge

Classical and modern concepts of international trade theory, instruments and institutions of trade policy, barriers to trade, preferential treatment and trading blocs, trends and issues. (Fall and spring)

257 **Business Policy in the Multinational Firm** (3) Grub, Dickie

International market entry and expansion; operating policies, procedures, and problems of multinational companies; developing executives for international business. Prerequisite: advanced Master's degree standing. (Fall and spring)

260 **Economics for Management** (3) Staff

Restricted to students in the Navy Graduate Financial Management Program. Economic theory and its application in managerial decision-making; price theory, income and employment theory, related topics. Review of economic methodology. (Summer)

261 **Applied Microeconomics** (3) Eldridge

Applications of economic theory and statistics to business decisions involving demand, production, cost, profits, investments, and inventories. Prerequisite: Econ 217, Mgt 203, Stat 111; or equivalent; or permission of instructor. (Fall and spring)

262 **Applied Macroeconomics** (3) Black

Use of economic theory and statistics in business forecasting; interpretation of economic trends and developments; analysis of governmental economic policies. Prerequisite: Econ 218, Mgt 203, Stat 111; or equivalent; or permission of instructor. (Fall and spring)

264 **Economics of Production** (3) Staff

Economics of production and manufacturing. Applications to managerial decision-making with respect to production, investment, procurement, research and development, and cost-benefit analysis. Prerequisite: Econ 217, Mgt 203, Stat 111. (Not offered academic year 1976–77)

265 **Seminar in Applied Economics** (3)

275 **Seminar: Transportation** (3) Staff

Problems and special areas of interest in transportation. Prerequisite: BAd 171 or permission of instructor. (Spring)

279 **Purchasing and Materials Management** (3) Page

Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics (Fall)

280 **Procurement and Contracting** (3) Sherman

Overview of procurement and contracting; emphasis on federal government buying policies, practices, and procedures. (Fall and spring)

282 **Government Contract Administration** (3) Sherman

Surveillance and management of contract performance. Measurement of progress; specification interpretation; quality assurance; changes, negotiation, and adjustment; financial considerations; property; terminations; regulatory and policy concerns. Prerequisite: BAd 280 or permission of instructor.

283 **Pricing and Negotiation** (3) Sherman

Scope and objectives of negotiated procurement; preparation, conduct and recording of negotiations; analysis of cost, price, profit, investment, and risk; cost principles; incentives; relationship of contract type to work requirements; techniques of negotiation. Prerequisite: BAd 280 or permission of instructor.

284 **Procurement Data Management** (3) Sherman

Technical data and the procurement process; contract-controlling documentation, patent rights, rights in data, requirements determination and the acquisition of data, federal policies, contractor interests. Configuration management; control of changes. Prerequisite: BAd 280 or permission of instructor.

285 **Systems Procurement and Project Management** (3) Staff

Development and procurement of major systems. Project management and its impact on the procurement process. Procurement planning. Prerequisite: BAd 280 or permission of instructor.

290 **Special Topics in Business Administration** (3) Staff

Experimental offering; new course topics and teaching methods. May be repeated once for credit.

291 **Seminar: Business Management** (3) Staff

Primarily for doctoral students. Research on various phases of management as practiced in American industry. (Fall and spring)

295 **Research Methods** (3) Staff

Same as Mgt 295 and PAd 295. Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings. (Fall and spring)

296 **Business Decision Simulation** (3) Staff

Managerial decision-making in a diversified firm in a simulated competitive environment in which a complex situation is played out using computers. Prerequisite: advanced Master's or doctoral degree standing.

297 **Business Policy Formulation** (3) Loeser, Carrington

Analysis of operational situations and policy issues. Developing and implementing solutions to managerial problems. Prerequisite: advanced Master's degree standing. (Fall and spring)

298 **Directed Readings and Research in Business Administration** (3) Staff

Supervised readings in selected fields within business administration. Admission by prior permission of instructor. May be repeated once for credit. (Fall and spring)

299 **Thesis Seminar** (3) Staff

Examination of thesis standards, research philosophy and methodology. (Fall and spring)

300 **Thesis Research** (3) Staff

(Fall and spring)

FOURTH GROUP

Fourth group Business Administration courses are limited to graduate students and are primarily for doctoral students. They are offered as the demand requires.

302 **Seminar: Government-Business Relations** (3) Timbers

Major current issues affecting government-business relations. Research and discussion on selected issues. Prerequisite: BAd 201, 202, 203; or permission of instructor.

331 **Seminar: Finance and Investments** (3) Amling

Research seminar in corporate financial theory, investment portfolio theory, and capital market theory. Prerequisite: BAd 232, 234, 238.

341 **Seminar: Marketing** (3) Dyer

Examination of major theoretical developments in marketing. Topics include advances in research methods, models and data analysis. Emphasis on emerging concepts in consumer behavior, channels, marketing communication and marketing information systems.

358 **Colloquium on International Business** (3) Grub

Selected problems in international business with emphasis upon regionalism, trade barriers, investment incentives, international organization, foreign aid, and development assistance and its relation to trade with developing nations, and trade with the Communist Bloc. Admission by prior permission of instructor.

359 **Colloquium on Comparative Management** (3) Lauter

Comparative analysis of management systems under different economic, social, and political conditions. Generic characteristics of management and how modified in different environments. Examination of selected literature.

365 **Seminar: Applied Economics** (3) Black

Primarily for doctoral students. Special topics and applications of analytical tools to business decision-making and policy. Prerequisite: BAd 261, 262, or permission of instructor.

381 **Seminar: Materials and Operations Management** (3) Staff

Recent developments in manufacturing production and materials management; impact of technological, economic and social change; significant related trends. Private and public sector policy implications. New and emerging analysis techniques. Prerequisite: BAd 225, 264, 279, 280, or equivalent; or permission of instructor.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Business Administration general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) Lauter

Limited to Doctor of Business Administration candidates. May be repeated for credit.

Chemistry

Professors R.C. Vincent, R.E. Wood (*Chairman*), T.P. Perros, W.E. Schmidt, D.G. White, J.B. Levy, N. Filipescu
Associate Professors A.D. Britt, E.A. Caress, D.A. Rowley
Assistant Professors M. King, D. Ramaker

***Bachelor of Arts* or *Bachelor of Science with a major in Chemistry* (*Departmental*).**—The department offers two undergraduate majors designed to give students broad training in the basic divisions of chemistry; analytical, inorganic, organic, and physical. *Major I* provides considerable concentration in chemistry. However, it permits a wider selection of electives and thus should meet the needs of students preparing to enter medicine, dentistry, or related fields. *Major II* is intended primarily for students preparing for graduate study in chemistry or those planning to enter the chemical profession and wishing to be certified to the American Chemical Society as having met the minimum requirements for professional training. Two foreign languages are recommended for students planning to do graduate work in chemistry.

The following requirements must be fulfilled:

1. Students in either Major I or Major II must meet the general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation into the Humanities and Social Studies.)

2. Prerequisite courses for Major I and Major II—Chem 11–12 and 22, or 15–17; Math 30, 31; Phys 1, 2.

3. (a) Required courses for Major I—BiSc 11–12 or Geol 21–22 (required of Bachelor of Science degree candidates only); Chem 111–12, 113–14, 122, 134, 141, 151–52, 153–54.

(b) Required courses for Major II—BiSc 11–12 or Geol 21–22 (required of Bachelor of Science degree candidates only); Chem 111–12, 113–14, 122, 141–42, 151–52, 153–54, 235; Math 32; one course selected from Chem 195, 207, 213, 222, 251, Math 111, 139, Phys 161, 165, 175, Stat 197.

Twelve semester hours in French, German, Greek, Hebrew, Italian, Latin, Russian, or Spanish (students in Major II should elect German) are recommended for students in both Major I and Major II.

For graduation with Special Honors in chemistry, application must be made at the beginning of the senior year. Registration in Chem 195 is required at that time

Master of Science in the field of Chemistry.—Prerequisite: a bachelor's degree with a major in chemistry from this University, or an equivalent degree.

Required: the general requirements pages 95–102. The required 30 semester hours of graduate work must include Chem 213 and 221, and at least two of the following: Chem 207, 236, and 251. The thesis requirement, Chem 299–300, may be in analytical, inorganic, organic, or physical chemistry. Chem 156, or its equivalent, is prerequisite to research work in the field of organic chemistry. A reading knowledge examination in French, German, or Russian (German or Russian preferred) must be passed prior to beginning the third semester of graduate work or before the second half of the work is started, whichever occurs first. A student who intends to become a doctoral candidate is strongly urged to take Chem 207 as early as possible in his graduate program.

Master of Science in the field of Geochemistry (an interdepartmental degree offered by the departments of Chemistry and Geology).—Prerequisite: a bachelor's degree with a major in chemistry or in geology from this University, or an equivalent degree.

Required: the general requirements, pages 95–102, including Chem 111–12; Geol 141, 241, 249; Chem 213 or Geol 246; and Chem 299–300. The Master's Comprehensive Examination must be taken before registration for the second half of the thesis work. A reading knowledge examination in a foreign language, approved by the department of chemistry or geology, must be passed prior to beginning the third semester of graduate work or before beginning the thesis work, whichever occurs first.

Doctor of Philosophy in the field of Chemistry.—Required: the general requirements, pages 95–97, 102–104. Chem 207, 213, 221, 235, 251, and 350 are normally required of the doctoral student, in addition to other courses as determined by consultation with the departmental program committee. The tool requirement options are (1) a foreign language reading examination in German and either French or Russian or (2) a foreign language reading examination in German and a demonstrated proficiency in computer programming. The latter option is required for students in physical or theoretical chemistry. Cumulative examinations replace the "General Examination" requirement.

Research fields: analytical chemistry, inorganic chemistry, organic chemistry, physical chemistry (electrochemistry, kinetics, magnetic resonance, theoretical), physical organic chemistry (reaction mechanisms) and structure and synthesis of natural products.

Doctor of Philosophy in the field of Geochemistry (an interdepartmental degree offered by the departments of Chemistry and Geology.)—Required: the general requirements, pages 95–97, 102–104, including a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 117 and 118, or 91; and the satisfactory completion of the General Examinations in four fields, including chemistry and geochemistry.

Bachelor of Arts in Education with a teaching field in Chemistry.—Prerequisite: the education curriculum, pages 81–82.

Required: the chemistry option and professional courses on pages 118–19, 126.

Graduate Placement Examinations: All entering students in the master's and doctoral programs in the field of chemistry are required to take the American Chemical Society Graduate Level Placement Examinations, given by the department of chemistry, prior to registration in the Graduate School of Arts and Sciences. The four placement examinations (in the disciplines of analytical, organic, inorganic, and physical chemistry) are of the multiple-choice type. These tests are designed to cover the subject matter in the disciplines generally taught in modern undergraduate programs preparatory for graduate work in chemistry, and the results are used by

the department to advise the individual student in planning a program of courses appropriate to the student's background.

Registration: Before completing registration each student must obtain from the representative of the department an assignment to lecture, recitation and laboratory sections. The work of the junior and senior years must be approved by the Department.

All graduate students are required to participate in the seminar and colloquium programs.

PHYSICAL SCIENCE

First Group

Filipescu

3–4 Contemporary Science (3–3)

For nonscience majors. Lecture (2 hours), laboratory (3 hours). Contemporary topics from the physical sciences are integrated to introduce the nonscience major to the basic methods and achievements of physical science. Laboratory fee, $17 a semester. (Academic year)

CHEMISTRY

First Group

Staff

11–12 General Chemistry (4–4)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $28 a semester. (Chem 11 and 12—fall and spring)

Brig

13 General Chemistry (4)

For engineering and applied science students only. Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Atomic structure, chemical bonding; chemical equations; acids and bases; chemical equilibrium; liquid and solid states; periodicity; electrochemistry; organic chemistry. Prerequisite: Math 31, Phys 2. Laboratory fee, $28. (Fall)

Rowle

15–16 Intensive General and Analytical Chemistry (Honors Course) (4–4)

Chem 15: lecture (3 hours), laboratory (3 hours), recitation (1 hour). Chem 16: lecture (2 hours), laboratory (6 hours), recitation (1 hour). Equivalent to Chem 11–12 and 22, but with selected topics studied in depth. Prerequisite to Chem 15: high school physics and chemistry. Prerequisite to Chem 16: Chem 15. Admission by placement test prior to registration or on basis of College Board Advanced Placement Examination. Laboratory fee, $28 a semester. (Academic year)

Vince

22 Introductory Quantitative Analysis (4)

Lecture (2 hours), laboratory (6 hours). Theory and practice of quantitative analysis by classical methods; introduction to instrumental analysis. Prerequisite: Chem 12. Laboratory fee, $28. (Fall and spring)

50 Introduction to Organic Chemistry (4) Caress

Lecture (3 hours), laboratory (3 hours). A terminal course for students in related disciplines. This course does not fulfill the organic chemistry requirement for chemistry majors or premedical students. Prerequisite: Chem 12 or 16. Laboratory fee, $28. (Spring)

Second Group

110 Introduction to Physical Chemistry (3) Wood

Topics include chemical thermodynamics, chemical kinetics, electrochemistry, solution chemistry, membrane and phase equilibria, and others. Prerequisite: Chem 16 or 22, Math 31, Phys 2; or permission of instructor. Not open to chemistry majors. May not be taken for credit by students who have received credit for Chem 111–12 or an equivalent course.

111–12 Physical Chemistry (3–3) Wood

Gas laws, chemical thermodynamics, solution chemistry, chemical equilibrium, kinetics, chemical statistics, electrochemistry, and other topics. Prerequisite to Chem 111: Chem 16 or 22; Math 31; Phys 2. Prerequisite to Chem 112: Chem 111. (Academic year)

113–14 Physicochemical Measurements (2–2) Wood, Schmidt

Laboratory complement to Chem 111–12 and 122. Prerequisite or concurrent registration for Chem 113: Chem 111. Prerequisite or concurrent registration for Chem 114: Chem 112, 113, and 122. Laboratory fee, $28 a semester. (Academic year)

122 Instrumental Analysis Lectures (2) Schmidt

Theory of instrumental methods in qualitative and quantitative analysis, determination of structure, and study of reaction mechanisms with emphasis on electroanalysis, spectrophotometry, and chromatography. Correlated with Chem 114. Prerequisite or concurrent registration: Chem 112. (Spring)

134 Descriptive Inorganic Chemistry (2) Naeser

Intermediate-level course emphasizing the descriptive chemistry of the elements. Prerequisite: Chem 16 or 22, 152. Prerequisite or concurrent registration: Chem 111. (Fall)

141–42 Advanced Experimental Chemistry (2–2) White, Caress

Designed to provide the chemistry major with facility in experimental methods common to all disciplines of chemistry. Prerequisite: Chem 154. Prerequisite or concurrent registration: Chem 111. Laboratory fee, $28 a semester. (Academic year)

151–52 Organic Chemistry (3–3) Staff

Chemistry of the compounds of carbon. Prerequisite to Chem 151: Chem 12 or 16. Prerequisite to Chem 152: Chem 151. (Academic year)

153–54 Organic Chemistry Laboratory (1–1) Staff

Laboratory complement of Chem 151–52. Prerequisite or concurrent registration: Chem 151–52. Prerequisite to Chem 154: Chem 153. Laboratory fee, $28 a semester. (Academic year)

156 **Qualitative Organic Analysis** (3) King

Lecture (1 hour), laboratory (6 hours). Identification of pure organic compounds, separation of mixtures, and identification of their components. Required of all students planning research work in organic chemistry. Prerequisite: Chem 16 or 22, 154. Laboratory fee, $28. (Spring, even years)

191 **History of Chemistry** (2) Perron

Historical development of chemistry from antiquity to the 20th century. Prerequisite: Chem 12 or 16. (Fall, odd years)

195 **Undergraduate Research** (1 or 2) Staff

Research on problems approved by the staff. May be repeated once for credit. Laboratory fee, $14 a semester hour. (Fall and spring)

Third Group

207 **Chemical Bonding** (3) Staff

Introduction to quantum chemistry. Molecular orbital theory, atomic and molecular structure spectroscopy. Prerequisite: Chem 112. (Fall)

211–12 **Physical Chemistry** (2–1) Wood

Same as Chem 111–12. Admission only by departmental permission. Credit assigned upon satisfactory completion of Chem 213. (Academic year)

213 **Chemical Thermodynamics** (3) Wood

Application of thermodynamics to chemical problems. Thermochemistry, homogeneous and heterogeneous equilibria, statistical calculation of thermodynamic properties, electrochemistry. Prerequisite: Chem 112 or 212. (Spring)

216 **Statistical Mechanics as Applied to Chemistry** (3) Staff

Introduction to classical and quantum statistics designed to acquaint the student with basic principles and application of method. Prerequisite or concurrent registration: Chem 207 or permission of instructor. (Spring, even years)

217 **Theory of Magnetic Resonance** (3) Staff

Application of quantum theory and the techniques of magnetic resonance to chemical problems; emphasis on the connection between theory and experiment. Molecular motion, relaxation theory, bonding, etc. Prerequisite: Chem 207 or permission of instructor. (Spring, odd years)

219 **Spectrochemistry** (3) Filipescu

Energetic states of molecules under the influence of electromagnetic radiation and their relation to structures and spectroscopic properties. Prerequisite: Chem 207 and 221, or permission of instructor. (Spring, odd years)

221 **Advanced Analytical Chemistry I** (3) Bro

Theory and application of recent spectrometric methods of analysis, including electrical, magnetic, and optical instrumentation. Prerequisite: Chem 122. (Fall)

222 **Advanced Analytical Chemistry II** (2 or 3) Schmidt

Lecture (2 hours), laboratory (3 hours—optional). Theory and application of electroanalysis and separations by physiochemical methods. Prerequisite: Chem 122. Laboratory fee, $14. (Spring, even years)

233 **Organometallic Chemistry** (3) White

Survey of organometallic compounds with emphasis on the compounds of lithium, boron, aluminum, silicon, the transition metals, and the catalytic role of certain organotransition metal complexes. Prerequisite: Chem 235 and 251, or permission of instructor. (Spring, even years)

235–36 **Advanced Inorganic Chemistry** (3–3) Rowley

Application of modern chemical theories to inorganic substances and reactions followed by a detailed study, developed from the periodic table, of the chemistry of the more common elements. Prerequisite to Chem 235: Chem 112, 152. Prerequisite to Chem 236: Chem 235. (Academic year)

237 **Physical-Inorganic Chemistry** (3) Rowley

Quantitative application of modern theories for interpretation and explanation of the electronic properties of transition-metal complexes. Prerequisite: Chem 112 and 134, or Chem 235. (Fall, odd years)

238 **Topics in Transition Metal and Inner-transition Metal Chemistry** (3) Perros

A systematic study of the significant and distinctive properties of the transition and inner-transition elements in relation to their positions in the periodic table. Prerequisite: Chem 236. (Fall, even years)

251–52 **Advanced Organic Chemistry** (3–3) Filipescu

Synthesis, reactions, and properties of organic compounds; fundamental theories of organic chemistry, emphasis on reaction mechanisms. Prerequisite to Chem 251: Chem 112, 152. Prerequisite to Chem 252: Chem 251. (Academic year)

257 **Physical-Organic Chemistry** (3) Levy

The transition state theory of chemical kinetics, applications to reaction mechanisms: kinetic isotope effects, linear-free energy relationships, concentrated and "super" acids, Woodward-Hoffman rules, free radical reactions. Prerequisite: Chem 252 or permission of instructor. (Fall, odd years)

258 **Synthesis and Structure Determination in Organic Chemistry** (3) Caress

Methods of structure determination and synthesis of complex organic molecules. Prerequisite: Chem 251 or permission of instructor. (Fall, even years)

295 **Research** (arr.) Staff

Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit not to exceed a total of 8 semester hours. Laboratory fee, $14 a semester hour. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
Laboratory fee, $28 a semester. (Fall and spring)

Fourth Group

350 **Choice and Design of a Research Problem** (1) Staff
Development in written form of an original research plan, fully refer-enced, and its oral defense. (Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy cumulativ examinations. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit (Fall and spring)

Chinese

See "East Asian Languages and Literatures."

Classics

Associate Professor J.E. Ziolkowski (*Chairman*)
Associate Professorial Lecturers A.B. Seidman, M.E. Norton
Assistant Professor M. Xiroyanni
Assistant Professorial Lecturers D.B. Beers, M. Leibovic, M. Pinkasovic, Seikevicz

Bachelor of Arts with a major in Classical Humanities (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—Clas 1–2, 3, 4; or equivalent; or Clas 11–12, 13–14; equivalent; or Clas 15–16, 17–18; or equivalent; or Clas 21–22, 23–24; or equivale and Clas 64, 71, 72.
3. Required courses in the major—(a) 12 semester hours selected from secon group classics courses; (b) 18 semester hours selected from Art 101, 102, 103, Hist 105, 108, 109, 110, 111; Phil 111; PSc 117.

Bachelor of Arts with a major in Classical Archaeology and Classics (Departmental).—An interdepartmental major arranged in conjunction with the departments art. The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students sho consult the departmental adviser regarding courses to be taken in satisfying requirement for "meaningful initiation" into the Natural and Mathematical Science
2. Prerequisite courses—Clas 1–2, 3, 4; or Clas 11–12, 13–14.
3. Required courses in the major—Art 101, 102, 103, 111; Hist 109, 110 semester hours in second-group courses in Greek or Latin, including Clas 138. reading knowledge of French and German is recommended.)

Master of Arts in the field of Classical Archaeology, Classics, and History (an interdepartmental degree program offered by the departments of Art, Classics, and History).—Prerequisite: a bachelor's degree with a background in classical archaeology and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 95–102. The program of study consists of 24 semester hours of course work (as many as possible should be third-group courses) selected in consultation with the appropriate adviser from the departments of art, classics and history; plus a thesis (equivalent to 6 additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

LATIN AND GREEK

First Group

1–2 **Beginning Latin** (3–3) Ziolkowski

Grammatical essentials of the language, appropriate reading selections, development of English derivatives, introduction to Roman life and literature. (Academic year)

3 **Intermediate Latin: Prose and Poetry** (3) Norton

(Formerly The Life and Times of Ovid)

Development of ability to read and understand Latin literature of moderate difficulty. Prerequisite: Clas 1–2 or equivalent. (Fall)

4 **Vergil's Aeneid** (3) Norton

Significant passages of Vergil's famous epic—in Latin; reading and discussion of the entire poem in translation. Prerequisite: Clas 3 or permission of instructor. (Spring)

11–12 **Beginning Greek: Classical** (3–3) Xiroyanni

Study of the grammar, vocabulary, and structure of Greek. Reading of selected classical authors. (Academic year 1977-78 and alternate years)

13–14 **Intermediate Greek: Classical** (3–3) Xiroyanni

Review of grammar; extensive reading of prose and poetry: e.g., Homer, Herodotus, or a play. (Academic year 1976–77 and alternate years)

15–16 **Beginning Greek: Modern** (3–3) Xiroyanni

Study of Modern Greek with conversation, composition, and reading of selected passages from contemporary Greek authors. (Academic year 1977-78 and alternate years)

17–18 **Intermediate Greek: Modern** (3–3) Xiroyanni

Review of grammar, conversation; extensive reading. (Academic year 1977-78 and alternate years)

Second Group

109–10 **Major Latin Authors** (3–3) Ziolkowski

Selections from one or two major authors will be read each semester. May be repeated for credit. Prerequisite: Clas 3–4 or permission of instructor. (Academic year)

131–32 **Latin Prose Composition** (1–1) Ziolkowski

Exercises in Latin prose composition for all students who have had at least one year of college Latin.

134 **Medieval Latin** (3) Andrews

Selections from the Vulgate and representative Latin writers through the 11th century. Prerequisite: Clas 3, 4; or permission of instructor. May be taken for graduate credit with approval of instructor. (Spring)

139–40 **Major Greek Authors** (3–3) Xiroyanni

Selections from a wide variety of Greek prose, drama, and poetry, suited to the needs of the class. May be repeated for credit with permission of instructor. Prerequisite: Clas 14. (Academic year)

141–42 **Greek Prose Composition** (1–1) Xiroyanni

Exercise in Greek prose composition. Prerequisite: Clas 12 and permission of instructor. (Academic year)

185–86 **Directed Reading** (1, 2, or 3) Staff

Reading of material in the student's field of interest. Admission by permission of instructor.

Third Group

201 **Greek Epigraphy** (3) Xiroyanni

Readings in Greek epigraphical texts. May be repeated for credit with permission of instructor. Prerequisite: at least two years of college Greek. (Fall)

COURSES IN ENGLISH TRANSLATION

First Group

64 **Greek and Latin Origins of English Words** (3) Xiroyanni

Study of Greek and Latin elements in English to improve vocabulary and facilitate understanding of the language of science, philosophy, politics, etc.

71 **Greek Civilization** (3) Xiroyanni

(Formerly Survey of Greek Literature)

Study of ancient Greek civilization with focus on public and private life as seen primarily through literature. (Fall) Staff

72 **Roman Civilization** (3)

(Formerly Survey of Latin Literature)

Study of Roman civilization with focus on public and private life as seen primarily through literature. (Spring)

Second Group

105 **Special Topics in Classical Literature** (3) — Staff
(Survey of Classical Humanities)

Focus on a selected topic, such as death in classical antiquity or the hero, or on study of a genre, such as satire or oratory.

108 **Classical Mythology** (3) — Norton

Mythology of the Greeks and Romans from the creation of the world: tales of the gods, heroes, and great families that have influenced literature, art, and music. (Fall)

113 **Greek and Roman Drama** (3) — Staff

Selected masterpieces of Greek and Roman tragedy and comedy. (Spring)

127 **Classical Influence on Western Civilization** (3) — Ziolkowski

A survey of Greek and Roman influence on Western civilization relevant to modern America: literature, art, law, science, philosophy, etc. (Fall)

138 **Seminar: Classical Studies** (3) — Beers

Survey of the broad range of sources and resources involved in pursuing classical studies: standard references, periodicals, library holdings, papyrology, textual criticism, history of classical scholarship.

170 **Women in Classical Antiquity** (3) — Norton

In-depth study and discussion of readings from ancient and modern sources on the role of women in Greek and Roman society.

HEBREW

First Group

21–22 **Beginning Hebrew** (3–3) — Staff

Elementary Hebrew grammar, readings from the Old Testament and contemporary literature, composition and conversation. (Academic year)

23–24 **Intermediate Hebrew** (3–3) — Staff

Review of grammar; continued development of reading comprehension, composition, and conversation. (Academic year)

Second Group

103–4 **Advanced Hebrew** (3–3) — Seidman

Readings in poetry, prose, Mishnaic Hebrew; survey of Semitic changes and origins; Biblical comparison with Dead Sea Scrolls; required research paper in Hebrew. (Academic year)

Drama

See "Speech and Drama."

East Asian Languages and Literatures

Professor C. Shih (*Chairman*)
Associate Professorial Lecturers M.J. Evans, T. Lawton
Assistant Professors G.C.Y. Wang, D.L. Lee, M.S. Duke

Bachelor of Arts with a major in Chinese Language and Literature in Columbia College of Arts and Sciences (Field-of-Study).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91, including Chin 1-2, 3–4, and 9; or Chin 7–8 and 9; or Chin 5–6 (preferred).

2. The completion of Chin 11–12, 109–10, 163–64, and the passing of the major examination at the end of the senior year. The coordinated field of knowledge upon which the student will be examined includes an active command of modern Chinese language and a general knowledge of Chinese literature and culture. A proseminar (Chin 199–200) assists the student in preparation for the major examination.

Bachelor of Arts with a major in Chinese Language and Literature in the School of Public and International Affairs.—See pages 175–80.

Bachelor of Arts with a major in East Asian Studies (China and Japan).—See pages 175–80.

CHINESE

First Group

*1–2 **Beginning Mandarin Chinese, Level I** (3–3)
Classroom (3 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 2: Chin 1. Laboratory fee, $17.50 a semester. (Academic year)

*3–4 **Beginning Mandarin Chinese, Level II** (3–3)
Classroom (3 hours), laboratory (1 hour). Continuation of grammar and spoken Chinese with more emphasis on the written language and reading. Prerequisite to Chin 3: Chin 2 or equivalent. Prerequisite to Chin 4: Chin 3. Laboratory fee, $17.50 a semester. (Academic year)

5–6 **Beginning Intensive Mandarin Chinese, Levels I-II** (8–8)
Intensive beginner's course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 6: Chin 5. Laboratory fee, $17.50 a semester. (Academic year)

*7–8 **Beginning Intensive Mandarin Chinese** (6–6)
Intensive beginner's course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 8: Chin 7. Laboratory fee, $17.50 a semester.

9 **Beginning Mandarin Chinese, Level II** (4)
Reading of simple modern expository writings. Analysis of syntactical structure and practice in writing. Prerequisite: Chin 4 or 8. Laboratory fee, $17.50. (Fall or spring)

* The combination of Chin 1-2, 3-4, and 9, or the combination of Chin 7-8 and 9, is equivalent to Chin 5-6.

11–12 **Intermediate Intensive Mandarin Chinese** (6–6) **Wang**

Reading basic texts, writing short pieces, conversation, systematic review of grammar. Prerequisite to Chin 11: Chin 6 or 9. Prerequisite to Chin 12: Chin 11. Laboratory fee, $17.50 a semester. (Academic year)

91–92 **East Asian Literature—in Translation** (3–3) **Staff**

Lecture and discussion. Survey of Chinese and Japanese literature, from earliest periods through literary masterpieces of the early 20th century.

Second Group

107–8 **Readings in Modern Chinese** (3–3) **Duke**

Intensive readings in selected modern literary works, social science materials, and documentary materials. Prerequisite: Chin 12 or equivalent. (Academic year)

109–10 **Introduction to Classical Chinese** (3–3) **Shih**

Introduction to classical writing in Chinese literature, history, and philosophy. Prerequisite: Chin 6 or 9. (Academic year)

123–24 **Introduction to Chinese Linguistics** (3–3) **Staff**

Introduction to the history of the Chinese language. Analysis of linguistic structure of modern spoken Chinese and classical Chinese. Prerequisite: Chin 6 or equivalent, or a course in linguistics.

161–62 **Introduction to Chinese Culture** (3–3) **Duke**

Survey of the Chinese cultural heritage—literature, philosophy, art, religion, and social history—from pre-history to the modern era. Lecture and discussion in English. (Academic year)

163–64 **Chinese Literature in Translation** (3–3) **Duke**

Lectures focusing on major works of poetry, drama, and the novel in their historical and social context. An introductory course. (Academic year)

171–72 **Poetry of the T'ang and Sung Periods** (3–3) **Staff**

Reading of works of leading poets. Discussion of content and style. Prerequisite: Chin 12 or equivalent.

173 **Yuan Drama** (3) **Shih**

Readings of plays by Kuan Han-ch'ing, Ma Chih-Yüan, Cheng Kuang-tsu, Po P'u, and Wang Shih-fu. Prerequisite: Chin 12 or equivalent.

177–78 **Prose Narratives of the Sung, Ming, and Ch'ing Periods** (3–3) **Staff**

Short stories of the Sung period. Selected readings of Ming-Ch'ing novels. Historical development and stylistic traits. Prerequisite: Chin 12 or equivalent.

179–80 **20th Century Chinese Literature** (3–3) **Shih**

Short stories of Lu Hsün, Lao She, and others. Informal essays by Lu Hsün, Chou Tso-jen, and Chu Tze-ch'ing. Drama of T'ien Han and Ts'ao Yü. Prerequisite: Chin 12 or equivalent.

185–86 **Directed Reading** (3–3) **Staff**

Reading of material in the student's field of interest. Admission by permission of instructor. (Academic year)

199–200 **Proseminar: Readings for the Major in Chinese Language and Literature** (3–3) Staff
Conferences and group discussions. (Academic year)

JAPANESE

First Group

1–2 **Beginning Japanese, Level I** (4–4) Staff
(Formerly Japn 21–22[8])
Lecture (four hours), laboratory (one hour). Fundamentals of gramma
and pronunciation with graded reading and practice in writing. Pre
requisite to Japn 2: Japn 1. Laboratory fee, $17.50 a semester. (Aca
demic year)

3–4 **Beginning Japanese, Level II** (4–4) Staff
Lecture (four hours), laboratory (one hour). Continuation of gramma
with more emphasis on written language and reading. Prerequisite to Jap
3: Japn 2. Prerequisite to Japn 4: Japn 3. Laboratory fee, $17.50
semester. (Academic year)

Economics

Professors J.W. Kendrick, C.T. Stewart, Jr., J. Aschheim, R.P. Sharkey, H
Solomon, S. Levitan, L. De Alessi, T. Suranyi-Unger, Jr. (*Research*), C
Hsieh, J.L. Gastwirth, W.A. Johnson (*Research*), M.A. Holman (*Chairman*)
Adjunct Professors T.F. Carroll, J. Grunwald, J.L. Fisher, N. Ture, P. Swamy
Professorial Lecturers J. Hardt, E.M. Hadley
Associate Professors R.Y. Yin, W.F.E. Long, S.E., Haber, R.M. Dunn, Jr.
R.S. Goldfarb, J.R. Barth
Adjunct Associate Professors E. Gramlich, J. Miller III
Associate Professorial Lecturers P.A. Musgrove, S.S. Sutton, M.J. K
J. Kraft, L. Girton, S.C. Salop
Assistant Professors A.M. Yezer, R. Sines, C.M. Aho, J.J. Cordes, F. Thoum
Assistant Professorial Lecturers S.W. Salant, R.B. Berner

Bachelor of Arts with a major in Economics (Departmental).—The follow
requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students s
consult the departmental adviser regarding courses to be taken in satisfying
requirement for "meaningful initiation" into the Humanities and the Natural
Mathematical Sciences.)

2. Prerequisite course—Econ 1–2.

3. Required courses in related areas—Math 51 and 52, or equivalent; Sta
and 112, or equivalent; 6 semester hours of a social study other than economi

4. Required courses in the major—Econ 101, 102, 121, 198, and 15 add
semester hours of second group economics courses to be approved by the dep
mental adviser.

Master of Arts in the field of Economics.—Prerequisite, a Bachelor of Arts

ree with a major in economics from this University, or an equivalent degree. An derstanding of basic calculus is assumed for those entering the Master of Arts pro- am in economics.

Required: the general requirements, pages 95–102, including (1) Econ 203–4, 205, 79; (2) 12 additional semester hours to be selected from other third-group Eco- mics courses; (3) a Master's Comprehensive Examination in economic theory; completion of a tool requirement (either the passing of a reading knowledge amination in one foreign language or the satisfactory completion of one of the owing courses: Math 124, Stat 97, or Stat 157–58); and (5) either a thesis (Econ 99-300) or 12 semester hours selected from additional third-group economics urses.

Doctor of Philosophy in the field of Economics.—Required: the general require- ents, pages 95–97, 102–104, including (1) Econ 202, 203–4, 205, 215–16, 379 or 80, and 24 additional semester hours of approved graduate course work including on 279; (2) passing of the General Examination in microeconomic theory, croeconomic theory and two other fields selected by the student and approved the doctoral program committee; (3) completion of the tool requirement (the ssing of a reading knowledge examination in one foreign language plus the isfactory completion of Math 124, Stat 97, or Stat 157–58; and (4) a dissertation demonstrate the candidate's ability to do original research in one of the following lds: econometrics, economic development, economic history, economic policy, nomic theory, environmental economics, history of economic thought, indus- l organization, international economics, labor economics, mathematical eco- mics, monetary economics, national income accounting, natural resources eco- mics, public finance, regional and urban economics and Soviet economics.

Departmental prerequisite: Econ 1–2 is prerequisite to all other courses in eco- mics except Econ 217–18.

IRST GROUP

1–2 **Principles of Economics** (3–3) Holman

Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1: mac- roeconomics; Econ 2: microeconomics. (Econ 1 and 2—fall and spring)

ECOND GROUP

101 **Intermediate Microeconomic Theory** (3) Kendrick, Yin

Analysis of supply, demand, and pricing. (Fall and spring)

102 **Intermediate Macroeconomic Theory** (3) Holman, Yin

Theories of national income determination and growth. (Fall and spring)

104 **History of Economic Thought** (3) Hsieh

History of the major schools of economic thought, influence of changing problems on the development of economic theory. (Spring)

105 **Economic Conditions Analysis and Forecasting** (3) Kendrick

Theory and empirical analyses of economic trends and fluctuations; use of economic indicators and simple econometric models. (Fall)

121 **Money and Banking** (3) Barth

Nature of money, credit, commercial banking, and other financial institutions in the U.S. monetary system. (Fall and spring)

122 **Monetary Theory and Policy** (3) Barth

Analysis of role of money in economic activity in terms of supply of and demand for loanable funds, interest rates and price level. Problems of U.S. monetary policy. Prerequisite: Econ 121. (Spring)

*123 **Introduction to Econometrics** (3) Staff

Construction and testing of economic models: regression theory, parameter estimation, and statistical techniques applicable to economic models. Prerequisite: Econ 101, 102; Math 31 or 51; Stat 111. (Spring)

130 **Comparative Economic Systems** (3) Aschheim, Yi

Critical exposition of fundamental economic concepts and theories of capitalism, communism, socialism, and fascism.

133 **Economy of the Soviet Union** (3) Haru

Development and main features of economic life in the Soviet Union. (Fall)

134 **Comparative Communist Economic Systems** (3) Haru

Analysis of economic development and performance of the Soviet Union and other Soviet-type economies. Institutional aspects and quantitative measures of performance. (Spring)

136 **Natural Resources and Environmental Economics** (3) Yezer

Analysis of market mechanisms for allocating energy and natural resources; cases of market failure in the use of the environment; policies to improve resource allocation using market and regulatory strategies. (Spring)

142 **Labor Economics** (3) Haro

Analysis of labor supply and demand; poverty and income maintenance; relation between wages, prices and unemployment; occupational choice.

†147 **Economic History of Europe** (3) Sha

European economic development since the Middle Ages; emphasis on the period following the Industrial Revolution. Evolution of capitalism and its impact upon the societies of Europe. (Spring)

‡153 **Poverty in America** (3) Boeckmann, Y

Exploration of social and economic causes of poverty in the United States and evaluation of present and proposed anti-poverty strategies, including comprehensive welfare reform. Discussion of conflicts between sociological and economic models of behavior of low income groups. Yezer

157 **Urban and Regional Economics** (3)

Analysis of the determinants of urban growth and development; firm location; the functioning of urban land and housing markets.

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* Interdepartmental course offered by the departments of economics and statistics
† Interdepartmental course offered by the departments of economics and history
‡ Interdepartmental course offered by the departments of economics and sociology

158 **Industrial Organization** (3) Long

Analysis of the structures and production, pricing, and related practices of industries with emphasis on their significance and on appropriate economic policies. (Spring)

160 **Social and Economic Indicators** (3) Staff

161 **Public Finance I** (3) Cordes

Theoretical and institutional analysis of government expenditures, taxation, and intergovernmental fiscal relations. (Fall)

162 **Public Finance II** (3) Cordes

Theoretical and institutional analysis of fiscal policy and debt management. (Spring)

165 **Economics of Human Resources** (3) Stewart, Goldfarb

Economic analysis of education and training, health care, and other contemporary problems. (Fall)

169 **Introduction to the Economy of Communist China** (3) Yin

Background, organization, and operation of the economy. Appraisal of performance and analysis of problems of development. (Fall)

170 **Introduction to the Economy of Japan** (3) Hadley

Analysis of the structure and growth of the Japanese economy. (Spring)

179–80 **U.S. Economic History** (3–3) Sharkey

Process of economic growth from Colonial times to the present. Development of various sectors in the economy and their interdependence. Econ 179: 1607–1865. Econ 180: 1865 to present. (Academic year)

181–82 **International Economics** (3–3) Dunn, Aho

Econ 181: international trade theory and international monetary theory. Econ 182: continuation of international monetary theory; economic development. (Academic year)

185 **Economic History and Problems of Latin America** (3) Thoumi

Analysis of present structures and problems of Latin American economies. (Spring)

198 **Proseminar in Economics** (3) Holman, Long

Examination of major topics in economic theory and the application of theory and analysis to policy problems. Open only to economics majors in their senior year. (Fall and spring)

199 **Independent Research in Economics** (3) Staff

Under the personal direction of an instructor. Limited to economics majors with demonstrated capacity. Prior approval of instructor required. (Fall and spring)

THIRD GROUP

[illegible]-group economics courses (except 217–18) are designed for graduate students [illegible]conomics or for graduate students with prescribed prerequisites.

[illegible]-departmental course offered by the departments of economics and history

202 **History of Economic Thought** (3) Hsieh

Critical analysis and interpretation of the development of economic theory from Plato through the "Keynesian Revolution" and the "Monetarist Counter-revolution." (Fall and spring)

203–4 **Microeconomic Theory** (3–3) De Alessi, Goldfarb

Econ 203: demand, production. Prerequisite: Econ 101 or equivalent. Econ 204: market structure, income distribution, intertemporal allocation, welfare economics; other topics. Prerequisite: Econ 203. (Econ 203 and 204—fall and spring)

205 **Macroeconomic Theory I** (3) Hsieh, Barth

Theories of income, employment and the price level; aggregate supply and demand; consumption, saving, investment and the multiplier; supply and demand for money; government's and central bank's role in the economy. (Fall and spring)

206 **Macroeconomic Theory II** (3) Hsieh, Barth

Capital and growth theory. Discussion of Cambridge controversy in the theory of capital and one- and two-sector models of economic growth. Other selected advanced topics in macroeconomics. (Fall and spring)

207 **Business Cycle Analysis** (3) Kendrick

Empirical analysis of American business cycles; evaluation of the methodology and findings of the National Bureau of Economic Research. (Spring)

208 **National Income** (3) Kendrick

Theory and measurement of economic aggregates within an integrated national income accounts framework, including balance sheets and wealth statements. (Spring)

210 **Economic Methodology** (3) Stewart

Methodology of economics, review of selected theoretical issues in economic theory. Prerequisite: 6 semester hours of graduate courses in economic theory. (Spring)

212 **Economics of Property Rights** (3) De Alessi

Application of microeconomic theory to decision-making within business and government organizations subject to alternative institutional constraints. Prerequisite: Econ 101. (Spring)

215–16 **Mathematical Economics** (3–3) Sto

Formulation and application of mathematical models in economic theory. Prerequisite: a one-year calculus sequence. Open to undergraduates. (Academic year)

217–18 **Survey of Economics** (3–3) Holen

For graduate students in fields other than economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived. (Econ 217 and 218—fall and spring)

223–24 **Monetary Theory and Policy** (3–3) Aschhe

Theory of monetary policy within the framework of contemporary American central banking. (Academic year)

233 **Seminar: Agrarian Reform, Income Distribution and Development** (3) — Carroll

(Formerly Seminar: Agrarian Reform and Development in Latin America)

Equity and income redistribution issues in the context of current developmental programs, stressing land reforms and recent Latin American experience. (Fall)

234 **Seminar: Rural and Regional Development Projects** (3) — Carroll

(Formerly Seminar: Evaluation of Rural Development Projects in Latin America)

Design and evaluation of rural-based investment projects, with case studies drawn from experience of international agencies, especially in Latin America. (Spring)

235 **Energy Resources and Policy** (3) — Johnson

Consideration of economic and related policy issues directed at energy problems. (Fall)

237 **Seminar: Economics of the Environment and Natural Resources** (3) — Holman

Analysis of public policy problems relating to the environment and natural resources development and management. (Spring)

241–42 **Labor Economics** (3–3) — Goldfarb

Theory of wages and employment, analysis of labor supply and demand. Structural unemployment; occupational choice; labor market discrimination. (Academic year)

243 **Seminar: Manpower Policy** (3) — Levitan

Developments leading to expansion of public investment in manpower resources; evaluation of goals and operations of publicly supported programs. Open to undergraduates. (Fall)

244 **Economics of Education** (3) — Staff

Returns to investment in education, allocation of resources to and within education, educational financing.

245–46 **Industrial Organization** (3–3) — Eads, Long

Structure and performance of the American economy; emphasis on the economics of antitrust policy and the impact of government regulatory policies. (Academic year)

247 **Seminar: Industrial Organization** (3) — Long

Selected topics in regulatory economics and in antitrust economics during alternate years. Topic for 1977: antitrust problems. Prerequisite: Econ 101 or equivalent. (Spring)

248 **Health Economics** (3) — Wilensky

Demand for medical care; organization of the health care delivery industry; policy issues on regulation, efficiency and allocation of health care services.

251 **Economic Development Theories** (3) — Thoumi

(Formerly Economic Development)

Basic theories of economic growth and development. Emphasis on theories inspired by the underdevelopment process. (Fall and spring)

252 **Economic Development Issues** (3) Thoum
(Formerly Economic Development)
Topics of current importance in underdeveloped countries, such as income distribution, industrial policies, economic integration, agricultural development and economic planning. Prerequisite: Econ 251. (Spring)

253 **Productivity Analysis** (3) Kendrick
Concepts, measurement, and analysis of productivity in business and government at aggregate and organizational levels. (Fall)

255 **Economics of Technological Change** (3) Staff
Economic principles related to determining the proper federal role in influencing civilian-oriented technological change. (Fall)

257 **Regional Economics** (3) Yezer
Analysis of firm location, patterns of interregional or intermetropolitan production, urban and regional growth and patterns of development. (Fall)

258 **Urban Economics** (3) Yezer
Analysis of spatial relationships among economic activities within an urban area including the urban land, labor, and housing markets; urban transportation models; fiscal relationships among jurisdictions. Prerequisite: Econ 257 or permission of instructor. (Spring)

259 **Income Distribution** (3) Staff
Theoretical and empirical analysis of income distribution, including analysis of policies related to income inequality. Open to advanced undergraduate Economics majors. (Fall)

261 **Welfare Economics** (3) Stewart
Theories of welfare economics and their applications to public policy; analysis of selected topics in public policy. (Fall)

263 **Theory of Public Finance I** (3) Tus
Allocation and distribution aspects of government budget policy, including critical analysis of theories and principles of expenditures, taxation, and intergovernmental fiscal relations. (Fall)

264 **Theory of Public Finance II** (3) Tu
Stabilization aspects of government budget policy: analysis of effects of fiscal policy and debt management on level of employment, prices, and rate of economic growth. (Spring)

267 **Seminar: Soviet Economy** (3) Har
Development of the Soviet-type economy. Organization, policies, and problems: monetary, production, allocative, foreign trade, economic growth. Admission by permission of instructor. (Fall)

268 **Seminar: Economic Theory and Development in Communist Countries** (3) Har
Appraisal of the Soviet model for economic development in the communist world, especially in Eastern Europe and China. Admission by permission of instructor. (Spring)

269 **Economy of Communist China I** (3) Yin

Analysis of organization, operation, policies, and problems. Development of the economy under communism. (Fall)

270 **Economy of Communist China II** (3) Yin

Continuation of Econ 269, examining critical problems of development. Prerequisite: Econ 269 or permission of instructor. (Spring)

271 **Economy of Japan** (3) Hadley

Analysis of Japanese economic institutions and their contribution to Japan's development. (Fall)

*275 **Econometrics I: Introduction** (3) Swamy

Single equation models of economic behavior. Statistical methods for testing economic hypotheses and estimating parameters. Introduction to simultaneous equations problems. Prerequisite: Stat 157–58 or equivalent, or permission of instructor. (Fall)

*276 **Econometrics II: Simultaneous Equation Models** (3) Swamy

Economic models and simultaneous equations systems. Prerequisite: Econ 275. Recommended: a course in matrix theory. (Spring)

*279 **Methods in Economic Statistics** (3) Gastwirth

Application of statistical methods to economics. Curve-fitting, regression, analysis of variance, and chi-square techniques used to analyze economic data. Prerequisite: a one-year course in statistics. (Fall and spring)

281–82 **International Economics** (3–3) Dunn, Aho

Econ 281: theory of international trade and factor movements. Econ 282: international finance. (Academic year)

285–86 **Economic Development of Latin America** (3–3) Grunwald

Econ 285: Development models, import substitution and industrialization; underemployment, inequality and policies for employment and income redistribution. Econ 286: Theory and performance in trade, economic integration, planning for development; foreign aid, foreign investment, technology transfers. (Academic year)

287 **Seminar: Problems in Latin American Civilization** (3) Staff

Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

298 **Reading and Research** (3)

Limited to Master's degree candidates. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

URTH GROUP

nth-group economics courses are limited to graduate students and are primarily d doctoral candidates. They are offered as the demand requires.

terdepartmental course offered by the departments of economics and statistics.

305 **Seminar: Macroeconomics** (3)
Selected topics in macroeconomics. Prerequisite: Econ 205.

312 **Seminar: Price Theory** (3)
Discussion of topics of price theory from recent journal articles.

313 **Seminar: Economic Thought** (3)
Continuation of Econ 202. Principal trends in economic thought.

315 **Seminar: Topics in Mathematical Economics** (3)
Intensive study of selected topics, including economic activity analysis, risk and uncertainty, and other topics of current interest. Prerequisite: Econ 215–16.

321 **Seminar: Monetary Theory** (3)
Recent developments in monetary theory.

341 **Seminar: Labor Economics** (3)
Current problems in theory and policy.

363 **Seminar: Public Finance** (3)
Selected topics of current interest.

*378 **Seminar: Topics in Econometrics** (3)
A research seminar covering current econometric literature and special topics. Admission by permission of instructor.

†379–80 **Readings in Economic History** (3–3)
Econ 379: American economic history. Econ 380: modern European economic history. Prerequisite: the appropriate second-group preparation and consent of instructor. (Academic year)

390 **Seminar: International Economic Theory** (3)
Limited to graduate students, primarily for doctoral students. Examination of recent contributions in this field.

391 **Seminar: International Economic Policy** (3)
Topics selected from current significant policy problems.

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Education

Professors W.T. Carroll, C.R. St. Cyr, M.E. Coleman, D. Sinick, R.E. Ba

* An interdepartmental course offered by the departments of economics and statistics.
† An interdepartmental course offered by the departments of economics and history.

M.N. Rashid, R. Tillman, A. Marinaccio, L.H. Elliott, L. Nadler, M. Brenner, J.G. Boswell, C.E. Vontress, R.J. Frankie, S. Kavruck, M. McIntyre
fessorial Lecturers W.W. Chase, D.D. Darland, A. Drexler, P.P. Muirhead, A.C. Jensen
ciate Professors D.A. Moore, L. Winkler, D. Linkowski (*Chairman*), E.P. Kawiec, G.L. Horrworth, R.I. Peterson, G.D. Wiggs, S.R. Paratore, G.W. ...th
ciate Professorial Lecturers M.L. Ware, D. Iwamoto, G. Nixon, J.W. ...eck
...tant Professors J.A. Kuhagen (*Research*), J.C. Heddesheimer, C. Reeder (*Research*), J.A. Greenberg, L.A. Tsantis
...tant Professorial Lecturers R.J. Kubalak, J.D. Gates, M.R. Phelps, R.E. McNelis, S.W. Boss, D.G. Speck, M.J.B. Duff, S.B.R. Elster
...ctors S.A.R. Hoth (*Research*), M. Gazvoda (*Research*)
...turer C.S.J. Gage

...grams of study leading to the degrees of *Bachelor of Arts in Education, Master of Arts in Education, Master of Arts in Teaching, Education Specialist,* and *...or of Education* are offered by the School of Education (see pages 10–37)

...OND GROUP

... 136, 137, 138, 139, 140, 142, 144, and 146 are special methods courses which ... be elected in the senior year by students in the secondary school curriculum ... substantial preparation in the teaching fields concerned. Course requirements ...urs of credit vary with license requirements. Practices of successful teachers ...ed actual teaching content as found in current texts and courses of study re... Prerequisite to all special methods courses: Educ 108, 123, and 131. Addi... prerequisites are stated under each course.

108 **Human Development, Learning, and Teaching** (3) — Horrworth, McIntyre

Lecture (2 hours), field work (3 successive hours each week, preferably in the morning, arranged by the Director of Laboratory Experiences). Principles of effective teaching based on an understanding of human development and the nature of learning. Prerequisite: Psyc 22; Psyc 29 or 112. (Fall and spring)

110 **Elementary School Teaching of Reading** (3) — Horrworth

Introduction to methods, techniques, materials, and activities essential to a good elementary school reading program. Prerequisite: Educ 108 and 123, or teaching experience.

111 **Elementary School Curriculum and Methods** (15) — Moore and Staff

For seniors. Curriculum and methods of teaching in the elementary school, reading, children's literature, mathematics, science, language arts, social studies, music, art, physical education. Pre-student teaching one and one-half days a week. Prerequisite: Educ 108 and 123. (Fall)

112 **Educational Measurement** (3) — Staff

Basic measurement techniques, selection, administration and interpretation of standardized tests, test construction and statistical analysis of test results. (Fall and spring)

113 **Elementary School Art** (3) Staff

Lecture and laboratory (3 hours), field work—as arranged. For undergraduates in the elementary school curriculum. Materials and methods. Material fee, $5. (Spring)

114 **Elementary School Music** (3) Staff

For undergraduates in the elementary school curriculum. Program of music activities essential to basic musical understanding. Materials and techniques.

118 **Elementary Reading: Classroom Diagnosis and Instruction** (3) Staff

Emphasis on diagnostic procedure aimed at individualizing and improving classroom instruction. Prerequisite: Educ 110 or equivalent. Concurrent registration in Educ 119 required for students in the M.A.T. in elementary education degree program. (Fall and spring)

119 **Elementary School Curriculum and Methods** (9) Horrworth and Staff

Limited to students in the M.A.T. in elementary education degree program. Curriculum, methods, and materials of reading, language arts, social studies, mathematics, science, music, art and physical education. Appropriate field experience coordinated during elementary school openings. Concurrent registration in Educ 118 required. (Fall)

123 **Society and the School** (3) Boswell

Historical and social development of education, contemporary issues, operation of the school with other community agencies, functions of school personnel. (Fall and spring)

124 **Communication Skills and Interpersonal Relationships** (3) Brew

Theory and practice in the development of professional relationships: teacher-child, teacher-parent, teacher-supervisor, utilizing interview and other activities. (Summer)

128 **Children's Literature** (3) McIntyre

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development. (Spring)

130 **Internship in Elementary Education** (6) Horrworth and Staff

Limited to students in the M.A.T. in elementary education degree program. Full-time teaching in an elementary school under cooperative supervision of the school system and the University staff. Admission by permission of instructor. Prerequisite: Educ 119, 135. (Spring)

131 **Secondary School Principles and Methods** (3) Boswell, Kulaw

For seniors. Classroom management and teaching techniques for initiating, guiding, and evaluating learning activities. Group-work to be arranged. Prerequisite: Educ 108 and 123. (Fall)

132 **Student Teaching in Early Childhood Schools** (6 to 9) McIn

For seniors. Admission by permission of instructor. Prerequisite: Educ 111 or equivalent; Educ 150, 152, 153. (Fall and spring)

133 **Supervised Experience in Education** (3 to 6) Staff

Field work, internship, and instructional practice: (1) adult education and human resource development (Wiggs); (2) college student development experience (Kirkbride); (3) higher education (Frankie); (4) museum education (Brenner); (5) counseling (Heddesheimer). Admission by permission of instructor. (Fall and spring)

134 **Student Teaching in Secondary Schools** (6 to 9) Boswell, Kulawiec, and Staff

For seniors. Admission by permission of instructor. Prerequisite: Educ 131. (Fall and spring)

135 **Student Teaching in Elementary Schools** (6 to 9) Horrworth, Moore, and Staff

For seniors and for students in the M.A.T. in elementary education degree program. Admission by permission of instructor. Prerequisite for seniors: Educ 111 or equivalent. Prerequisite for M.A.T. students: Educ 220. (Seniors—fall and spring; M.A.T. students—fall)

136 **Teaching English in Secondary Schools** (3) McNelis

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours in English. (Spring)

137 **Teaching Speech** (3) Staff

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours in speech or permission of instructor. (Spring)

138 **Teaching Social Studies in Secondary Schools** (3) Boswell

Lecture (2 hours), field work (2 hours). Prerequisite: 24 semester hours of social studies. (Spring)

139 **Teaching Art in Secondary Schools** (3) Staff

Lecture (2 hours), laboratory (2 hours). Prerequisite: 24 semester hours of Art. Material fee, $5. (Spring)

140 **Teaching Mathematics in Secondary Schools** (3) Gates

Lecture (2 hours), field work (2 hours). Prerequisite: mathematics through calculus. (Spring)

142 **Teaching Music in Secondary Schools** (3) Staff

Prerequisite: 24 semester hours of music.

144 **Teaching Science in Secondary Schools** (3) Kulawiec

Lecture (2 hours), field work (2 hours). Prerequisite: 24 semester hours of science. (Spring)

146 **Teaching Foreign Languages** (3) Kulawiec

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours of one foreign language. (Spring)

150 **Foundations of Early Childhood Education** (3) McIntyre

Historical developments, philosophy, and objectives of nursery schools, kindergartens, and day care centers; exploration of contemporary programs and models with curriculum implications. Admission by permission of instructor. (Fall)

152 **Early Childhood Curriculum** (3) McIntyre

Content, approaches, methods, and materials in language arts, mathe matics, science, health, social studies, and creative arts. Admission by per mission of instructor. (Fall)

153 **Role of the Professional in Early Childhood Education** (3) McIntyre

Planning, reporting, records, teacher-child and teacher-family interaction diagnosis and evaluation, working with paraprofessionals. Admission by permission of instructor. (Spring)

154 **Community Resources and Materials for the Young Child** (3) McIntyre

Interaction with community for services and resources: physical facilities, including play activities and curriculum materials for the young child. Ad mission by permission of instructor. (Spring)

THIRD GROUP

Departmental prerequisite: A degree from an accredited institution is prerequisite to all third-group courses in Education. Adequate professional preparation is pre requisite to all third-group courses in Education except for those courses limited to students in the M.A.T. degree program. Undergraduate students in their senior year may enroll in third-group courses with permission from the instructor.

200 **Special Workshop in Education** (arr.)
(Formerly Educ 400)

Topics to be announced in *Schedule of Classes*. May be repeated for credit.

201–2 **Seminar: International Education** (3–3) Mead

Survey of selected foreign educational systems and cultures. Research techniques, and materials to develop world-mindedness. Embassy resources utilized.

203–4 **Comparative Education** (3–3) Kulawiec

A systematic investigation of the educational structure and practices of selected representative school systems throughout the world. Emphasis on development of a methodology for comparative study. St Cyr

205–6 **The Curriculum** (3–3)

For experienced teachers. Educ 205: curriculum foundations and evaluation, comparison of curriculum patterns. Educ 206: curriculum development in subject areas, group consideration of student problems. (Academic year) St Cyr

207 **Curriculum Materials** (3 to 6)

For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations. Rasor

208 **Human Development** (3)

Consideration of human development and behavior throughout the life span, emphasis on practical implications of relevant interdisciplinary research. (Fall and spring)

209 **Child Development** (3) Rashid

Interdisciplinary approach to child development and behavior. Practical implications of research in disciplines contributing to knowledge about childhood. (Fall and spring)

210 **Adolescent Development** (3) Rashid

Interdisciplinary approach to adolescent development and behavior. Practical implications of research in disciplines contributing to knowledge about adolescence. (Spring)

212 **Quantitative Methods I: Introduction to Survey Measurement and Research** (3) Paratore, Smith, and Staff

(*Formerly*: *Quantitative Methods I*: *Measurement*)

Introduction to measurement techniques and research methodology. Emphasis on descriptive and elementary statistical principles as applied to educational measurement and research. (Fall and spring)

213–14 **History of Education** (3–3) Frankie

Educ 213: European backgrounds of American education. Educ 214: evolution of the American school system. (Academic year)

216 **Education of Slow-learning Children** (3) Staff

Identification, nature, and needs of slow-learning elementary and junior high school children. Emphasis on diagnosis and treatment of learning difficulties.

217–18 **Philosophy of Education** (3–3) Darland

Educ 217: to help students formulate a personal philosophy of education. Educ 218: social foundations of education—forces that shape policies and offerings of the school. (Academic year)

219 **Elementary School Classroom Procedures** (3) Baker

Current theories of teaching and learning and their application to teaching acts and strategies of elementary school teachers. (Spring)

220 **Elementary School Teaching Foundations** (9) Horrworth and Staff

Limited to students in the M.A.T. in elementary education degree program. Introductory block course dealing with the content of professional education courses; history and philosophy of education; educational psychology; human development, learning, and teaching; society and the school; elementary school organization. 160 class hours supplemented by field experience.

222 **Foundations of Reading Instruction—Early Childhood** (3) Coleman

Historical and psychological background; readiness, special approaches and skills for beginning readers; evaluation of materials; demonstrations of diagnostic and instructional techniques. (Fall)

223 **Foundations of Reading Instruction—Elementary and Secondary** (3) Coleman

(*Formerly Foundations of Reading Instruction*)

Historical and psychological background; evaluation of recent methods, materials and techniques in teaching reading; demonstrations of diagnostic and teaching techniques. (Fall)

224 **Diagnostic Teaching of Reading** (3) Colen

Classroom diagnostic and instructional techniques for elementary sch level; construction of informal tests; administration and interpretation informal and standardized tests; study of materials and application readability formulas. Prerequisite: at least one previous course in read (Spring)

226 **Reading in Secondary School and College** (3) Colen

Methods, techniques, and materials necessary for testing and develo efficient reading skills, including skills in content subjects; organizing evaluating reading programs. (Spring)

227 **Basic Issues in Elementary Education** (3) Ba

Identification, definition, and analysis of some of the most important p lems facing the contemporary American elementary school. (Fall)

228 **Instructional Areas in Elementary Education** (3) Ba

Current trends and research on reading, language arts, social stu mathematics, science, music, art, and physical education.

229 **Administration of Elementary Education** (3) Ca

For experienced teachers and administrators. Achieving instructional jectives, organizing and servicing teaching activities, coordinating sc and community life. (Fall)

230 **Intern Seminar for M.A.T. Students** (3) Horrw

Planning and supervision of individual action research projects. (Spr

231 **Secondary School Classroom Procedures** (3) Bos

Current classroom practices: teacher-pupil planning, group proced initiatory and culminating activities, individual and group evaluation niques, teaching aids, etc.; review of recent literature.

232 **Supervision of Elementary Education** (3) Ca

For experienced teachers and administrators with two or more yea teaching experience. Review of modern supervisory concepts, inclu practices in the operation of the elementary school. (Spring)

233 **Audio-visual Education** (3) Kub

Lecture (2 hours), laboratory (1 hour). Selection, evaluation, and u audio-visual materials; administrative problems in care, operation, tenance, and use of such materials and equipment. Material fee, $7 (Spring)

235 **Analysis of Teaching** (3) Bo

Teaching as work: diagnosing learning skills, program planning and i mentation, feedback information on both student and program. (

236 **Introduction to Education Technology** (3) W

Consideration of historical perspective, process, instrumentation, and plementation of self-instructional systems. W

237 **Systems Approach to Instructional Design** (3)

Application of systems techniques to the development of an instruct program.

241 **Education of the Gifted** (3) Staff

For classroom teachers. Nature and discovery of giftedness, provisions for the gifted in regular classes, experimental projects.

243 **Human Relations in Education** (3) Marinaccio

Principles and practices in human relations between and among learner, teacher, other school personnel, and parents.

245 **School and Community** (3) Marinaccio, Greenberg

The school as an important member of a team of social agencies that builds the community.

246 **Administrative Issues in Urban Education** (3) Staff

Investigation of current issues in urban education. (Fall and spring)

247 **Adult and Preprofessional Technical and Occupational Education** (3) Staff

Development, current concepts, agencies involved, problems, and trends in adult vocational-technical-occupational education in the United States and foreign countries.

249 **Drug Treatment and Resources** (3) Reeder

Individual, social, and cultural factors related to drug abuse. Rehabilitative methods in treating drug abusers; use of community resources. (Spring)

250 **Counseling Drug Abusers** (3) Reeder

Counseling theory and practice applied to drug abusers. Crisis intervention, self-help groups, and family therapy; individual and group counseling. (Fall)

251 **Foundations of Counseling** (3) Heddesheimer, Winkler

Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues. (Fall and spring)

252 **Organization and Administration of Guidance Services** (3) Vontress

Procedure and practice in organizing and administering school guidance and pupil personnel programs. Admission by permission of instructor. (Spring)

253 **Individual Appraisal in Counseling** (3) Winkler

Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: Educ 112 or equivalent. (Fall and spring)

254 **The Middle School** (3) Kulawiec

Development, organization, and practices; emphasis on the learner, the teacher, the administrator, the curriculum, and the setting of the school for the preadolescent. (Fall)

255–56 **Secondary Education** (3–3) Kulawiec

Examination of historical, psychological, sociological, and philosophical bases; emphasis on prescriptive implications. Special attention to contemporary problems and practices. (Academic year)

257 **Career Development and Information** (3) Sinick, Vontress

Theories of career development; factors influencing the world of work; procedures for evaluating and using socio-personal, educational, and occupational information. (Fall and spring)

258 **Theories and Techniques of Counseling** (3) Heddesheimer, Vontress

Theories and practices of vocational, educational, and personal counseling. Prerequisite: 12 semester hours in guidance and counseling, including Educ 253 and 257. (Fall and spring)

259 **Secondary School Administration** (3) Fleck

For experienced teachers and administrators. Survey of administration, including practices of the modern high school. (Fall)

260 **Secondary School Supervision** (3) Fleck

For experienced teachers and administrators. Review of modern supervisory concepts, including practices in schools. (Spring)

261 **Practicum in Counseling** (3) Heddesheimer, Vontress

Intensive counseling experience under supervision. Emphasis on relationship dynamics, analysis, recommendations, and follow-up. Prerequisite: Educ 258. (Fall and spring)

262 **Internship: Counseling** (3) Heddesheimer, Vontress

Counseling experience under University and institutional supervision in a variety of settings. Prerequisite: Educ 261. (Spring)

263 **Human Resource Development: Training and Education** (3) Wiggs, Nadler

Concepts and purpose, historical backgrounds, roles of human resource development personnel, program areas. Prerequisite: adequate professional preparation or experience in training, education, and development. (Fall)

264 **Design of Training Programs in Human Resource Development** (3) Nadler

(Formerly Program Planning in Human Resource Development)

Training, education, and development programs for various client systems will be planned using critical events conceptual model. Field work. Prerequisite: Educ 263 and permission of instructor. (Spring)

*267 **Interdisciplinary Study of Language Disorders** (3)

For graduate students in education, speech and hearing and psychology. Psycho-educational team participation, team diagnosis and analysis of case studies. Multidisciplinary understanding of philosophies of learning and treatment of symbolic malfunctioning. (Fall) Fleck

269–70 **School Business Management** (3–3)

Educ 269: philosophy, responsibilities, and functions of the business management office in public education institutions. Educ 270: practicum in educational business management. (Academic year)

* An interdisciplinary course offered by the departments of education, psychology and speech drama.

271 **The Teacher and School Administration** (3) Carroll

Role of federal, state, and local administrative units; school finance; legal controls; school plant; public support; improving teaching conditions. (Fall and spring)

272 **The Teacher and School Supervision** (3) Carroll, Tillman

Nature, organization, human relationships, and techniques. (Fall and spring)

273–74 **Teacher Education** (3–3) Boswell

Educ 273: aims, objectives, and basic issues; study of outstanding and experimental programs. Educ 274: recruitment and selection, general education, teaching field preparation, professional sequences, laboratory experiences. (Academic year)

275 **Seminar: School Finance** (3) Carroll

Educational financial theory, practice, and control, including methods of financing. (Fall)

276 **Seminar: Public Relations in School Administration** (3) Carroll

Purposes, gathering materials, disseminating agencies, publicity media, public participation in policy-making. (Spring)

278 **School Law** (3) Ware

Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group. (Spring)

279 **Adult Education** (3) Nadler, Wiggs

Current concepts and objectives, historical development, agencies involved, personnel, clients, programs on all levels—community through international. (Fall)

280 **Program Planning in Adult Education** (3) Wiggs

Determining educational needs for adults in school and non-school agencies, planning programs and instruction, budgeting and scheduling of adult programs. Field work with sponsoring agency. Prerequisite: Educ 279 and permission of instructor. (Spring)

283 **Higher Education in the United States** (3) Frankie

History, scope, purpose, present status, programs, and trends in higher education in the United States. (Fall and spring)

284 **Administration of Higher Education** (3) Marinaccio

Government, organization, and administration of colleges and universities; duties of trustees and administrators. (Fall and spring)

285 **Student Activities** (3) Staff

Nature and purposes of selected activities—homeroom, clubs, assemblies, school publications, student council, interscholastic contest; attention to sponsorship, participation, finance, and evaluation.

287–88 **Clinical Study of Reading Problems** (3–3) Coleman, Peterson

For advanced students. Diagnostic and corrective work under supervision in the Reading Center. Prerequisite: Educ 223 and 224 or 226, or equivalent. Material fee, $10 a semester. (Academic year)

289 **Organization and Administration of Reading Programs** (3) Peterson
(Formerly Supervisory Problems in Reading)
For principals, assistant principals, supervisors, superintendents and reading teachers. Problems in planning, reorganizing and improving the total reading program. (Fall)

290 **Severe Learning Disabilities in Reading** (3) Peterson
For experienced teachers. Case studies of children and/or adults with severe reading problems, planning and implementing instructional programs. Admission by permission of instructor. Material fee, $10. (Spring)

291 **Planning the School Plant** (3) Chase
Selection of sites; evaluation of existing buildings; utilization of present facilities; adaptation to curricular needs; building, operation, and maintenance problems. (Fall)

293–94 **Research and Independent Study** (3–3) Staff
Individual research under guidance of a staff member. Program and conferences arranged with an instructor. (Academic year)

295 **Quantitative Methods II: Research Procedures** (3) Paratore, Smith
Required of all candidates for graduate degrees in Education. Analysis of scientific approaches to problems in education: evaluation of research techniques. Prerequisite: Educ 112, 212; or equivalent. (Fall and spring)

297 **Personnel Administration** (3) Carroll
Organization and administration of personnel programs for educational institutions. Basic philosophy, principles, responsibilities, and functions

298 **Seminar: Personnel Administration** (3) Carroll
Research: policies, rules and regulations, staff organizations, negotiations

299–300 **Thesis Research** (3–3) Staff
Required of M.A. in Ed. degree candidates writing Master's theses. (Fall and spring)

301 **Data Processing in Education** (3) Staff
Machine accounting and computer technology for counselors, teachers and administrators.

302 **Quantitative Methods III: Inferential Techniques** (3) Paratore, Smith
Educ 302 or Stat 105 is required of all doctoral students in Education. Prerequisite: Educ 212 or a basic statistics course and permission of instructor. (Fall and spring)

303 **Data Analysis** (3) Linkowski
Use of computer in data analysis. For doctoral students at the dissertation-planning stage. (Fall)

304 **Practicum in Supervision** (3 to 6) Carroll, Tr...
Supervised practical experience in supervision of instruction. Admission by permission of instructor.

305 **Internship: Supervision** (3 to 6) — Carroll, Tillman

Service in a school situation directed by the University and school systems to integrate theory and practice.

306 **Quantitative Methods IV: Advanced Research Design** (3) — Paratore, Smith

Required of all doctoral students in Education. Evaluation and application of educational research designs. Prerequisite: Educ 302 or equivalent. (Fall and spring)

310 **Museum Studies** (3) — Hoth

Limited to students in the M.A.T. program in Museum Education. Study of museums' functions and their relationship to museum educational roles.

311 **Museum Audiences** (3) — Brenner

Limited to students in the M.A.T. program in Museum Education. Study of the many audiences of many ages who use and enjoy museums.

312 **Internship in Museum Education** (6) — Hoth

Full-time placement in education departments in area museums. Supervision and seminar are provided by George Washington University faculty. Limited to students in the museum education program.

316 **Curriculum Developments in Elementary School Social Studies** (3 to 6) — Moore

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor.

317 **Curriculum Developments in Elementary School Science** (3 to 6) — St. Cyr

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor.

320 **Curriculum Developments in Elementary School Mathematics** (3 to 6) — St. Cyr

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor. (Spring)

321 **Practicum in Curriculum** (3 to 6) — St. Cyr

Supervised field experience in curriculum. Admission by permission of instructor. (Fall and spring)

322 **Internship: Reading** (3 to 6) — Peterson

Limited to doctoral students in Education. Experience in a selected area of college teaching. (Fall and spring)

323 **Internship: Reading** (3 to 6) — Peterson

Limited to doctoral students in Education. Service in a school situation directed by the University and school system to integrate theory and practice. (Fall and spring)

324 Teaching Reading and Study Skills at the College Level (3) Staff

Evaluation of reading skills at the college level. Development of college reading programs, including diagnostic and teaching techniques, program planning and implementation. Prerequisite: Educ 226 or equivalent, and permission of instructor. (Summer)

325 Curriculum Theory (3) St. Cyr

Examination of reviews and research studies in curriculum theory. Focus on trends, values, interpretations, fads, design systems and evaluation. (Fall)

330 Foundations of Early Childhood Education (3) McIntyre

Historical developments, philosophy and objectives of nursery schools, kindergartens and day care centers, exploration of contemporary programs and models with curriculum implications. (Fall)

332 Early Childhood Curriculum (3) McIntyre

Content, approaches, methods, and materials in language arts, mathematics, science, health, social studies, and creative arts. (Fall)

333 Role of the Professional in Early Childhood Education (3) McIntyre

Planning, reporting, records, teacher-child and teacher-family interaction, diagnosis and evaluations, working with paraprofessionals. (Spring)

334 Community Resources and Materials for the Young Child (3) McIntyre

Interaction with community for services and resources; physical facilities including play activities and curriculum materials for the young child. (Spring)

335 Practicum in Early Childhood Education (3 to 6) McIntyre

Supervised professional activity in selected early childhood programs; seminar. Prerequisite: 12 semester hours in early childhood education and permission of instructor. (Fall and spring)

336 Practicum in Reading (3) Coleman, Peterson, and Staff

Supervised experience in testing and teaching in the Reading Center. Approximately 120 class hours required. Laboratory fee, $10. Admission by permission of instructor. (Fall and spring)

341 Cognitive Models and Instruction (3) Rash

Cognitive models (Guilford, Piaget, etc.) are analyzed as the theoretical basis for planning instructional episodes appropriate at various levels of childhood through adulthood. (Fall)

342 Language Development (3) Rash

Nature of language development; role of language in the socialization process. (Spring)

343 Advanced Studies in Human Development (3) Rash

Review and consideration of classical and empirical research studies in selected topics in human development. Issues, instrumentation and research needs in respect to each topic discussed. Admission by permission of the instructor. (Fall)

353 **Counseling Older Persons** (3) Sinick

Special considerations and counseling emphases on second careers, retirement adjustments, death and dying. (Spring)

354 **Counseling of Minority Groups** (3) Vontress

Consideration of problems and approaches related to counseling cultural and racial minorities in American society; emphasis on counseling the disadvantaged in urban areas.

355 **Counseling in Groups** (3) Heddesheimer, Reeder, Winkler

Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling. (Fall)

356 **Seminar: Guidance and the Disciplines** (3) Staff

For experienced counselors. Exploring the foundations of guidance through the disciplines of psychology, sociology, economics, anthropology, and philosophy.

357 **Personal and Social Adjustment** (3) Winkler

Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents. (Fall and spring)

358 **Advanced Theories of Counseling** (3) Vontress, Reeder, Heddesheimer, Linkowski

Critical analysis and evaluation of leading counseling theories and consideration of their implications for practice. Intended for Education Specialist and Doctor of Education degree candidates whose area of concentration is counseling. Admission by permission of instructor. (Fall)

361 **Medical Aspects of Rehabilitation Counseling** (3) Sinick

Etiology, symptomatology, and treatment of chronic and traumatic disorders with rehabilitation counseling implications. Admission by permission of instructor. (Fall)

362 **Client Evaluation in Rehabilitation Counseling** (3) Kuhagen, Sinick

Test and nontest methods of furthering client and counselor understanding. Prerequisite: Psyc 131. (Spring)

363 **Psychosocial Aspects of Rehabilitation Counseling** (3) Linkowski

Impact of congenital and later disabilities on attitudes, self concepts, and motivations. Implications for rehabilitation counseling. Admission by permission of instructor. (Fall)

364 **Middle-management in Rehabilitation** (3) Kuhagen

Technical and interpersonal aspects of supervisory and other management responsibilities related to professional and support personnel. Theory and practice in case management and staff development. Case study and role playing.

365–66 **Field Work in Rehabilitation Counseling** (3–3) Kuhagen, Reeder

Field work of one full day a week. Educ 365: concurrent seminar including history, philosophy, and introduction to practice. Educ 366: concurrent seminar including job analysis, placement, and follow-up. Admission by permission of instructor. (Academic year)

367–68 **Internship: Rehabilitation Counseling** (6–6) Kuhagen, Reeder
Supervised practice of three full days a week, with seminar providing integration of theory and practice. Prerequisite: Educ 365–66. (Academic year)

369 **Professional Issues in Rehabilitation Counseling** (3) Staff
Culminating seminar covering professional problems and ethical issues. Prerequisite: Educ 367. (Spring)

370 **College Students and Their Community** (3) Staff
Survey of literature on the characteristics, behavior, and attitudes of the contemporary college student; college student interaction with his environment. Admission by permission of instructor. (Fall)

371 **Principles and Practices in College Teaching** (3) Greenberg
General principles, methods, techniques, and experimental instructional media for teaching at the college and university level. (Fall)

372 **Internship in College Teaching** (3 to 6) Greenberg
Supervised experience in a selected area of college teaching. Prerequisite: Educ 371. Admission by permission of instructor. (Spring)

373 **The Community-Junior College** (3) Greenberg
The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges. (Fall)

374 **Current Issues in Higher Education** (3) Elliott, Marinacci
Prerequisite: Educ 283, 284. (Spring)

375 **Foundations of a College Student Development Program** (3) Staff
College student development as an integral part of higher education programs. (Fall)

376 **College Student Development and Campus Groups** (3) Staff
Principles and procedures of student development programs with campus groups; campus group activities and development of student leadership. (Spring)

377 **Practicum in College Student Development** (3 to 6) Staff
Supervised practical experience in college student development programs. Admission by permission of instructor. (Fall and spring)

378 **Practicum in Teacher Education** (3 to 6) Brenner, Bossert
For selected experienced teachers. Supervised field work relevant to student's professional needs, to be arranged. (Fall and spring)

379 **Practicum in Adult Learning Programs** (3 to 6) Nadler
Supervised practical experience in various forms of adult education and human resource development. Admission by permission of instructor. (Fall and spring)

380 **Sensitivity Training: Laboratory Method** (3) Drexler, Lamb

A sensitivity learning experience in human relations using unstructured group experience, individual feedback, experimentation, and practice. Admission by permission of Department, prior to registration. (Fall and spring)

381 **Adult Learning** (3) Wiggs

Learning theories as applied to adults in individual and group learning transactions; effect of age on learning; psychological, physical, and social environment in adult education situations. (Fall and spring)

382 **Instructional Strategies in Adult Learning Programs** (3) Nadler
(Formerly Methods and Techniques of Adult Learning)

Methods, techniques, and devices for adult learning; developing action-oriented learning situations in adult learning programs. (Spring)

383 **Interviewing-Counseling for Human Resource Developers** (3) Wiggs
(Formerly Counseling of Adults)

Applications of interviewing, coaching and counseling skills for the human resource development specialist and others in various occupational settings.

384 **Evaluation of Adult Learning Programs** (3) Nixon, Wiggs

Measurement and evaluation of adult learning programs in school and nonschool agencies—business, industry, government, voluntary organizations, and community.

385 **Collective Negotiations in Higher Education** (3) Frankie

Theory, practice, problems, and issues in collective negotiations in higher education.

386 **Current Issues in Adult Learning Programs** (3) Wiggs

For M.A. in Ed. degree candidates. Current issues and trends in the fields of adult education and human resource development. Admission by permission of instructor. (Spring)

387 **Administration of Adult Learning Programs** (3) Eyre

Program administration, staff recruitment and development, fiscal operations, facilities, and maintenance of effective community relations. (Fall)

388 **Case Studies in Higher Education Administration** (3) Marinaccio

Limited to advanced doctoral students in Education. Analysis of selected hypothetical cases related to essential administrative functions of colleges and universities. Admission by permission of instructor.

389 **Consultant-Client Relationships in Human Resource Development** (3) Nadler

Examination of the consulting process, consultant-client behaviors, and dilemmas using theory and field experience for individual and organizational development. Prerequisite: Educ 264, 280; or approval of instructor. (Fall)

390 **Legal Problems in Higher Education** (3) Frankie

Investigation of legal problems in higher education related to administration, students, faculty, and academic program. (Spring)

391 **College and University Curriculum** (3) Greenberg

Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum. (Spring)

392 **Financing Higher Education** (3) Muirhead

Analysis of private, state, and federal revenue sources; student aid, program budgets, and financial methods and practices. (Fall)

393 **Practicum in Higher Education** (3 to 6) Frankl

Supervised field experiences in higher education; reports and conferences. Admission by permission of instructor. (Fall)

394 **College and University Governance** (3) Marinacci

Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 284. (Fall)

395 **Problems and Practices in Educational Administrative Organization** (3 to 6) Marinacci

Application of principles and practices concerned with change and evaluation of educational administration.

396 **Internship: Higher Education Administration** (3 to 6) Marinacci

Service in a higher education situation directed by the University and its cooperating institution to integrate theory and practice. (Fall and spring)

397 **Internship: Elementary Administration** (3 to 6) Carroll, Brem

Service in a school situation directed by the University and school system to integrate theory and practice. (Fall and spring)

398 **Internship: Secondary Administration** (3 to 6) Carroll, Fleck

Service in a school situation directed by the University and school system to integrate theory and practice. (Fall and spring)

399 **Seminar: Applied Educational Administration** (3 to 6) Carroll

Application of the theories and principles of administration to the public schools. Student participation with guidance by recognized regional practitioners.

FOURTH GROUP

A master's degree from an accredited institution is prerequisite to all fourth-group courses. All fourth-group seminars are open to doctoral candidates or other post-master's degree students with approval of instructor. Study is individually planned on the basis of previous study and experience in the subject field to attain an advanced level of competence and meet identified professional needs or field requirements.

Each of the following courses is offered fall and spring. Each course may be repeated for credit.

401 **Seminar: History of Education** (arr.) Frankl

403 **Seminar: Philosophy of Education** (arr.) Dar

405 **Seminar: Human Growth and Development** (arr.) — Rashid

411 **Seminar: Elementary Education** (arr.) — Baker

413 **Seminar: Secondary Education** (arr.) — Kulawiec

421 **Seminar: Adult Education** (arr.) — Nadler

422 **Seminar: Higher Education Administration** (arr.) — Marinaccio

423 **Seminar: Higher Education** (arr.) — Marinaccio

424 **Seminar: College Student Development** (arr.) — Kirkbride

425 **Seminar: Teacher Education** (arr.) — Boswell, Baker

427 **Seminar: Human Resource Development** (arr.) — Nadler

429 **Seminar: Educational Personnel Administration** (arr.) — Carroll

431 **Seminar: Administration** (arr.) — Carroll

433 **Seminar: Supervision** (arr.) — Fleck

434 **Seminar: Elementary Supervision** (arr.) — Carroll

435 **Seminar: Elementary Administration** (arr.) — Carroll

436 **Seminar: Secondary Supervision** (arr.) — Fleck

437 **Seminar: Secondary Administration** (arr.) — Fleck

441 **Seminar: Curriculum** (arr.) — St. Cyr

443 **Seminar: Guidance and Counseling** (arr.) — Staff

445 **Seminar: Research and Evaluation** (arr.) — Paratore, Smith

446 **Seminar: Reading** (arr.) — Peterson

490 **Pre-dissertation Seminar** (3) — Staff

Required of all Ed.D. degree candidates. Approval of the dissertation prospectus is necessary for successful completion of the seminar. Admission by permission of instructor.

491 **Dissertation Research** (arr.) — Staff

Preparation of a research outline; research and writing of an approved doctoral dissertation under the direction of major adviser and dissertation committee. Prerequisite: Educ 490.

Education Policy—Graduate Study

COMMITTEE ON EDUCATION POLICY

J. Lange (*Chairman*), S.K. Bailey, A.D. Kirsch, H.L. LeBlanc, P.H.M. Lauterman, M.N. Rashid, C.T. Stewart, Jr.

The Graduate School of Arts and Sciences offers an interdepartmental program leading to the degree of Doctor of Philosophy in the field of Education Policy. The program is directed by a committee whose members are drawn from the School of Education and from the departments of economics, political science, psychology, sociology and statistics.

The scope of the program is policy research and analysis as it relates to education, broadly conceived. It is intended for those who wish to pursue or continue academic careers or careers in policy-making positions.

Required: the general requirements, pages 95–97, 102–104. Candidates must complete four fields of study, one of which must be education policy analysis. Each candidate is to develop a concentration within one academic discipline.

Staff

201–2 **Seminar: Current Issues in Education Policy** (3–3)
Review of literature relating to current education policy issues with emphasis on use of research and analysis in formulating and evaluating policy.
Staff

222 **Seminar: Topics in Education Policy** (3)
Intensive investigation of special topics in education policy.
Staff

290 **Advanced Studies in Education Policy** (3)
Supervised study and field work in selected policy areas.

English

Professors C.D. Linton, R.H. Moore, P.H. Highfill, Jr., J.G. Allee, Jr., J.F. Reesing, Jr. (*Chairman*), E.R. Weismiller, R.N. Ganz, Jr., K.A. Burnett (*Research*), E Langhans (*Research*)
Adjunct Professors J.C. Broderick, J.L. Barroll III
Associate Professors M.H. McClanahan, A.E. Claeyssens, Jr., R.C. Rutledge, J.A. Quitslund, J.A.A. Plotz, J.H. Maddox
Assistant Professors C.W. Sten, G.R. Bozzini, A.V. Cannon, R.L. Combs, G. Carter, G. Paster, D. McAleavey, J.R. Schneider
Adjunct Assistant Professors C.H. Greer, N. Thomas
Assistant Professorial Lecturer L.A. Weigant
Instructors M.A. Romines, C. Walker
Lecturers B.L.H. Sterman, R.V. Arana, C. Heise, M.A. Strom, J.M.J. Wuschevich, C.L. MacMullan, M. Morrison, K.A. Baskin, R.C. Birss, M.A. Corrigan, M.N. Coughlin, M.V.W. Dow, I.C. Gruber, A.C. Shadell, G.F. Stein, G. Tyson

Bachelor of Arts with a major in American Literature or *English Literature* (*Field-of-Study or Departmental*).—The following requirements must be fulfilled.

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural or Mathematical Sciences.)
2. Prerequisite courses—Engl 51–52 or 61–62 or 71–72 or 191–92.
3. Required courses in related areas—(a) 12 semester hours of a foreign language (Classical Hebrew, Greek, Latin, French, German, Italian, Russian or Spanish.

valent; (b) 6 semester hours of philosophy and or religion; (c) 6 semester s of history (English, American, European or World).

Required for the major:

Field-of-Study major—the passing of the major examination in either Ameri- or English literature at the end of the senior year. No set pattern of courses escribed. The student is expected to engage himself more or less systematically writers and works from the whole chronological span of American literature nglish literature. Proseminars in American Literature, Engl 199–200, and in ish Literature, Engl 195–96, assist students in their preparation for the major mination. *Students who wish to be candidates for graduation with Special Honors ther American or English literature must be in the field-of-study major.*

Departmental major—30 semester hours of second-group courses offering rence with several approaches to literature which, together, make a discipline literary study—practical criticism, history of literature, literary period(s), e(s), and major author(s)—distributed as follows:

merican Literature majors—Engl 120; 21 semester hours of American literature ses, including Engl 161–62; 6 semester hours of English literature courses.

nglish Literature majors—Engl 120, 193–94; 3 semester hours of American litera- , and 18 additional hours of courses offered by the department of English of h at least 15 hours must be in English literature.

laster of Arts in the field of American Literature.—Prerequisite: the degree of helor of Arts with an undergraduate major in English, or 24 semester hours in ish and/or American literature above the sophomore level.

equired: the general requirements, pages 95–102, including (1) 24 semester hours ourse work planned in consultation with the adviser on the basis of the stu- 's undergraduate preparation, including a minimum of 6 semester hours in lish literature; (2) a written Master's Comprehensive Examination; (3) a Mas- thesis (6 semester hours) written on an approved topic under the direction he instructor in whose field the major portion of the material falls, or, with the roval of the Department adviser, 12 additional semester hours in lieu of thesis.

laster of Arts in the field of English Literature.—Prerequisite: the degree of helor of Arts with an undergraduate major in English or American literature, or emester hours in English and/or American literature above the sophomore level.

equired: the general requirements, pages 95–102, including (1) 24 semester hours ourse work, planned in consultation with the adviser; (2) a written Master's Com- ensive Examination; and (3) a master's thesis (6 semester hours) written on approved topic under the direction of the instructor in whose field the material , or, with the approval of the department adviser, 12 additional semester hours es of thesis.

octor of Philosophy in the field of American Literature.—Required: the general irements, pages 93–97, 100–102; *high-level* proficiency in an appropriate foreign guage, the passing of a General Examination in four of the six following fields, of which must be English literature: (1) Early American literature—to 1815, American fiction, (3) American poetry, (4) American Romanticism, (5) ean realism, (6) English literature—one of the first seven fields listed below der "Doctor of Philosophy in the field of English Literature." Each student plans gram in consultation with a departmental committee.

octor of Philosophy in the field of English Literature.—Required: the general irements, pages 95–97, 102–104; *high-level* proficiency in an appropriate foreign guage the passing of a General Examination in four of the eight following fields: beginnings to 1500, linguistics and history of the language; (2) 1500–1660; 1660–1800; (4) 1800–1900; (5) 1900 to present; (6) drama, including Shake- ; (7) criticism; (8) American literature—one of the first five fields listed ng under "Doctor of Philosophy in the field of American Literature." Each plans a program in consultation with a departmental committee.

Bachelor of Arts in Education with a a teaching field in English.—Prerequisite: the education curriculum, pages 81–82.

Required: the English option and the professional courses listed on pages 119 2 126.

Students whose College Board English Composition Achievement Test scores sug gest inadequate preparation may be assigned to Engl 9 or may be tested in vo cabulary, spelling, grammar, standard usage, and writing skill, before placement i either Engl 9 or 10. Students whose scores and/or writing skill indicate superio competence will be allowed to waive Engl 10; those whose scores indicate marked superior competence will be allowed to waive both Engl 10 and Engl 11 or 12.

The admission of international students to any English course is determined by the English Placement Test for Foreign Students. Students should apply to the offi of English for International Students to take this test (see pages 27–28).

Departmental prerequisite: Engl 9 or 10 is prerequisite to all other courses i English. A 6-semester-hour course in literature, or equivalent, or written permissio of the instructor, is prerequisite for admission to all second-group courses in Englis except Engl 115, 161–62 and 191–92.

ENGLISH AS A FOREIGN LANGUAGE

First Group

1 **English for International Students** (0) Bozzini and Staf

Elementary grammar, reading and vocabulary. Course meets 15 class hours and five monitored laboratory hours a week. Further laborator work encouraged. Fees: tuition, $882; laboratory fee, $17.50.

2 **English for International Students** (0) Bozzini and Staf

Lower intermediate grammar, reading and vocabulary. Course meets class hours and five monitored laboratory hours a week. Further laborato work encouraged. Fees: tuition charged for five semester hours—$4 plus laboratory fee, $17.50.

3 **English for International Students** (3) Bozzini and Staf

Higher intermediate grammar, reading, and vocabulary review for in national students not yet ready for extended training in composition Course meets four hours a week. Optional laboratory work. Fees: tuition $294; special fee, $25; laboratory fee (if applicable), $17.50.

4 **English for International Students** (3) Bozzini and Staf

Semi-intensive higher intermediate grammar, reading, vocabulary re view, and conversation, for international students not yet ready for ex tended training in composition. Course meets 10 class hours and fiv monitored laboratory hours a week. Further laboratory work encourage Fees: tuition charged for five semester hours—$490, plus laboratory $17.50.

5 **English Composition for International Students** (3) Bozzini and St Extended writing practice for international students showing high degr of proficiency in use of English. Development of writing skills, study expository techniques and library research methods. Course meets fo hours a week. Students completing Engl 5 with a grade of *A* or *B* m

receive academic credit for the course and may enroll in Engl 11 or 12 to fulfill the Columbian College undergraduate requirement in English. Fees: tuition, $294; special fee, $25.

9 **English Composition: Language as Communication** (3) — Moore and Staff

Intensive course in English grammar and composition for students inadequately prepared for Engl 10. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 10. Engl 9 meets five hours a week and carries three semester hours of credit. Fees: tuition, $294; special fee, $25. (Fall and spring)

ENGLISH COMPOSITION

First Group

10 **English Composition: Language as Communication** (3) — Moore and Staff

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure. (Fall and spring)

11 **English Composition: Language and the Arts and Sciences** (3) — Moore and Staff

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected readings on the nature of language and of the arts and sciences. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 11 cannot receive credit for Engl 12. (Fall and spring)

12 **English Composition: Language in Literature** (3) — Moore and Staff

Study and practice of expository and argumentative techniques through critical writing; emphasis on the rhetorical complexities of stylistics in the sentence and in diction, and on logical thought, by the study of literary genres and of the use of language in literature. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 12 cannot receive credit for Engl 11. (Fall and spring)

Second Group

101 **Expository Writing** (3) — McClanahan, Moore

Types of expository writing; weekly exercises based on students' needs; particular attention may be given to problems in the writing of graduate theses. Prerequisite: Engl 9 or 10; 11 or 12. (Fall and spring)

102 **Narrative Writing** (3) — Weismiller, McAleavey

Techniques of narrative writing; class criticism of student writing. Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. To apply for the instructor's consent a student should, before registration, submit samples of his writing. (Fall and spring)

103 **The Writing of Fiction—the Short Story** (3) McAleavey

Prerequisite: Engl 102, consent of instructor. To apply for the instructor's consent a student should, before registration, submit a writing sample. (Fall)

105–6 **The Writing of Plays** (3–3) Claeyssens

Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. To apply for the instructor's consent a student should, before registration, submit a writing sample.

107 **The Writing of Fiction—the Novel** (3) Claeyssens

Prerequisite: Engl 102 or 103; consent of instructor. To apply for the instructor's consent a student should, before registration, submit a writing sample. (Spring)

108 **Advanced Writing—Poetry and Prose** (3) McAleavey

Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. To apply for the instructor's consent a student should, before registration, submit a writing sample. (Fall)

ENGLISH LITERATURE

First Group

51–52 **Introduction to English Literature** (3–3) Quitslund and Staff

Representative works by major authors studied in their historical context; discussion of recurrent themes, and introduction to various types and forms of imaginative literature. (Academic year)

61–62 **Comedy and Tragedy** (3–3) Staff

The modes of comedy and tragedy as developed in drama, nondramatic verse and prose fiction in literatures from ancient to modern times. Engl 61: comedy—Chaucer to Borges. Engl 62: tragedy—Book of Job to Beckett. (Academic year)

Second Group

111 **Medieval English Literature—Exclusive of Chaucer** (3) Staff

112 **Chaucer** (3) Staff

(Spring)

115 **Introduction to English Linguistics** (3) Staff

Development of the English language in a historical treatment of English grammar. (Fall)

116 **Medieval Legend and Saga** (3) Staff

Celtic and Norse.

117–18 **English Poetry: Form and Content** (3–3) Weismiller

Study of poetry in English, both traditional and modern; emphasis on the ordering of language by which poetry brings into being patterns of thought and feeling which release meaning. (Engl 117—fall)

120 **Practical Criticism** (3) Plotz
(Formerly Engl 121)
Consideration of various uses of language and complex shapes of thought in literature; introduction to mature study and full enjoyment of poetry, fiction, and drama. (Fall and spring)

123 **Principles of Literary Criticism** (3) Plotz
Studies in works of major critics with a view to clarifying the ways in which works of art are analyzed, described, classified, judged, and justified; Aristotle, Longinus, Dryden, Johnson, Coleridge, Schiller, Arnold, Eliot, Richards, Frye.

125–26 **Elizabethan Verse and Prose** (3–3) Quitslund
Engl 125: major authors of lyric poetry, prose fiction, and criticism of the later 16th century. Engl 126: poetry of Spenser and Shakespeare. (Engl 126—fall)

127–28 **Shakespeare** (3–3) Highfill
Development of dramatic forms and recurrent themes. Engl 127: histories and comedies. Engl 128: tragedies. (Academic year)

129 **The Earlier 17th Century** (3) Reesing
Poetry and prose to 1660, exclusive of Milton.

130 **Milton** (3) Reesing

131–32 **English Literature, 1660–1780** (3–3) Highfill
Poetry and prose of the Neoclassic period. Engl 131: 1660–1740. Engl 132: 1740–1780. (Academic year)

133–34 **The Romantic Movement** (3–3) Plotz
Engl 133: Blake, Wordsworth, Coleridge. Engl 134: Byron, Shelley, Keats.

135–36 **Victorian Literature** (3–3) Carter
Engl 135: Tennyson, Browning, Arnold; Dickens; Carlyle, Ruskin. Engl 136: George Eliot, Browning, Tennyson, Swinburne, Hardy, Hopkins, Wilde, Pater.

137–38 **The 20th Century** (3–3) Linton
Literature since 1900. Engl 137: poetry and criticism. Engl 138: drama and the novel. (Engl 138—spring)

145–46 **Special Topics in English Literature** (3–3) Plotz, Paster
Engl 145: Romanticism and revolution—imaginative literature that stands behind and interprets the Age of Revolution. Jefferson, Rousseau, Blake, Goethe and others. Engl 146: the garden and the city. Readings (Chaucer to T. S. Eliot) in the literary treatment of setting and city-country themes. (Academic year)

147–48 **Special Topics in English Literature** (3–3) Maddox, McAleavey, Linton
Engl 147: Irish literature in the 20th century. The literary renaissance from Yeats to Beckett. Engl 148: two sections offered—(1) the literary avant-garde, 1906–1946; (2) the Bible in English literature.

151 **19th Century British Poetry** (3) Staff
Readings in Wordsworth, Keats, Browning and Swinburne.

153–54 **The English Novel** (3–3) Maddox
Major novelists. Engl 153: 18th century. Engl 154: 19th century. (Academic year)

155–56 **The English Drama** (3–3) Paster
Engl 155: principally the drama of Shakespeare's contemporaries. Engl 156: historical survey, 1660 to present. (Academic year)

157 **20th Century Drama** (3)
Representative continental, English, and American plays of the 20th century.

158 **20th Century British Prose Fiction** (3) Plotz

191–92 **Introduction to European Literature** (3–3)
(Formerly Engl 91–92)
Selected major works in various genres, read in translation and in entirety. Engl 191: *Iliad* and *Aeneid;* dramas from ancient to modern times. Engl 192: Plato, Ovid and Dante; medieval saga and romance; prose fiction from Cervantes to Mann. Open to freshmen and sophomores. May not be taken to satisfy the requirement for "meaningful initiation" into the Humanities. (Academic year) Reesing

193–94 **History of English Literature** (3–3)
(Formerly Engl 122)
(Academic year)

195–96 **Proseminar in English Literature** (3–3)
For field-of-study majors in English Literature. Readings, conferences and group discussions. (Academic year)

197 **Independent Study** (3) Reesing and Staff
Open to honors candidates in the field-of-study major during their senior year. (Fall and spring)

198 **Senior Honors Thesis** (3) Ganz and Staff
An independent-study course in which, under the guidance of an instructor, the student writes a thesis on an approved topic. Open to qualified seniors in the field-of-study major in English Literature. (Fall and spring)

Third Group

212 **Studies in Chaucer** (3)

213 **Old English** (3)
Old English grammar and readings. (Fall)

214 **Beowulf** (3)
Prerequisite: Engl 213 or equivalent. (Spring)

217 **English Poetry: the Formal Development** (3) — Weismiller

218 **Form and Content in Modern Poetry** (3) — Weismiller

219 **Research Methods and Bibliographical Materials** (3) — Broderick
To acquaint graduate students with the principal sources of bibliography and the typical problems in research. (Fall)

220 **Studies in Modern Dramatic Literature** (3)

221 **Studies in Comic Literature** (3)

223–24 **Studies in Literary Criticism** (3–3) — Plotz
(Engl 223—fall)

225–26 **Studies in 16th Century English Literature** (3–3) — Quitslund
(Engl 226—spring)

227–28 **Studies in Shakespeare and His Contemporaries** (3–3) — Paster
(Academic year)

229 **Studies in English Literature, 1600–1660** (3) — Reesing
Chief figures exclusive of Milton.

230 **Studies in Milton** (3) — Reesing

231–32 **Studies in English Literature, 1660–1780** (3–3) — Highfill

233–34 **Studies in the Romantic Movement** (3–3) — Plotz

235–36 **Studies in Victorian Literature** (3–3) — Carter
(Academic year)

237–38 **Studies in 20th Century Literature** (3–3) — Linton
(Engl 237—fall)

253–54 **Seminar: the English Novel** (3–3) — Maddox
(Engl 254—spring)

255–56 **Studies in Dramatic and Theatrical History** (3–3) — Highfill
Engl 256: seminar in drama and theatre of the Restoration and 18th Century, held among the Folger Library collections. A Folger Institute Seminar.

299–300 **Thesis Research** (3–3) — Staff
(Fall and spring)

Fourth Group

George Washington University is a member of the Folger Institute of Renaissance and 18th-century Studies. The policies of the Institute are set by a central committee on which each member institution is represented. Doctoral students enrolled in one of the Institute seminars are eligible to apply for fellowship aid. Folger Insti-

tute Seminars are numbered 301 through 309. Students wishing to register for these courses should consult the chairman of the department of English.

301 **English Renaissance Poetry: the Establishment of the Forms** (3) Weismiller
(Fall)

302 **English Renaissance Palaeography** (3) Staff
(Spring)

303 **Petrarch and Sonnet Sequences** (3) Staff
(Fall)

304 **Literary Change in 18th Century British Literature** Staff
(Spring)

305 **Folger Institute Seminar** (3)
Topic will be announced. (Fall) Staff

306 **Folger Institute Seminar** (3)
Topic will be announced. (Spring)

307 **Folger Institute Seminar** (3)
Topic will be announced. (Fall)

308 **Folger Institute Seminar** (3)
Topic will be announced. (Spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

AMERICAN LITERATURE

First Group

71–72 **Introduction to American Literature** (3–3) McClanahan and Staff
Historical survey. Engl 71: from beginnings to the Civil War. Engl 72: from the Civil War to present. (Academic year)

Second Group

120 **Practical Criticism** (3)
(Formerly Engl 121)
Consideration of various uses of language and complex shapes of thought in literature; introduction to mature study and full enjoyment of poetry, fiction and drama. (Fall and spring)

161–62 **Studies in American Literature** (3–3)
Same as AmCv 161–62. Major factors in the national cultural tradition as shown by outstanding writers. (Academic year)

163–64 **Major American Poets** (3–3) Ganz

Advanced critical study of significant writers and movements. Engl 163: from beginnings through the 19th century. Engl 164: the 20th century. (Academic year)

165–66 **American Drama** (3–3) Claeyssens

Historical and critical study of significant plays and forms. Engl 165: from beginnings to 1930. Engl 166: since 1930. (Academic year)

167–68 **The American Novel** (3–3) Sten, Maddox

Historical and critical study of significant novels. Engl 167: from beginings through the 19th century. Engl 168: 20th century. (Academic year)

170 **The American Short Story** (3) Staff

Historical development of the short story in America. (Spring)

171–72 **Major American Writers** (3–3) Staff

173–74 **Selected Literary Movements** (3–3) Combs, Ganz

Engl 173: literature of the thirties. Engl 174: the cluster of genius in America, 1890–1920. Major figures in music, architecture, philosophy, law and science, as well as literature (Charles Ives, Louis Sullivan, Frank Lloyd Wright, William James, Santayana, Holmes, Robinson, Stephen Crane and Dreiser). (Academic year)

175–76 **Special Topics in American Literature** (3–3) Claeyssens, Cannon

Engl 175: autobiography as literature. A broad survey on the varieties of autobiographical work in American literature, from Colonial times to the present. Engl 176: American women writers. (Academic year)

177–78 **Contemporary American Literature** (3–3) Ganz, Claeyssens

Major and representative works since World War II. (Academic year)

197 **Independent Study** (3) Reesing and Staff

Open to honors candidates in the field-of-study major during their senior year. (Fall and spring)

198 **Senior Honors Thesis** (3) Ganz and Staff

An independent-study course in which, under the guidance of an instructor, the student writes a thesis on an approved topic. Open to qualified seniors in the field-of-study major in American Literature. (Fall and spring)

199–200 **Proseminar in American Literature** (3–3) Staff

For field-of-study majors in American Literature. Readings, conferences, and group discussions. (Academic year)

Third Group

219 **Research Methods and Bibliographical Materials** (3) Broderick

To acquaint graduate students with the principal sources of bibliography and the typical problems in research. (Fall)

263–64 **Studies in American Poetry** (3–3)
(Academic year)

267–68 **Seminar: American Fiction** (3–3)
Research and critical reading: fiction and the criticism of fiction.
(Engl 267—fall)

270 **Seminar: the American Short Story** (3)

281–82 **Seminar: Early American Literature** (3–3)
Same as AmCv 281–82.

283–84 **Studies in American Romanticism** (3–3)
Engl 283: Melville—the early fiction. Engl 284: Emerson, Thoreau and the Concord Group, the intellectual background and the literary achievement
(Engl 284—spring)

285–86 **Seminar: American Literature, 1865–1900** (3–3)
Realism in America. (Academic year)

299–300 **Thesis Research** (3–3)
(Fall and spring)

Fourth Group

367–68 **Readings in American Fiction** (3–3)
For graduate students only. Literature and the critical materials in which graduate students are responsible on the Doctor of Philosophy general examination

381–82 **Readings in Early American Literature** (3–3)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit
(Fall and spring)

Environmental Studies

COMMITTEE ON ENVIRONMENTAL STUDIES

H. Merchant (*Chairman*), O. Bergmann, S.W. Burks, R.S. French, I.I. Goldman, R.W. Kenny, R.C. Lindholm, W.E. Schmidt

Columbian College of Arts and Sciences offers interdepartmental programs in Environmental Studies leading to the degree of Bachelor of Arts or Bachelor

of Science. The program leading to the degree of Bachelor of Arts is designed for the student whose orientation is essentially political or social and who expects to enter law, politics, urban planning, or other areas for the purpose of altering society's responses to environmental problems. The program leading to the degree of Bachelor of Science is designed for the student with well developed interests in science who seeks professional identification as a field or laboratory worker in the environmental sciences.

Bachelor of Arts with a major in Environmental Studies (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.

2. Prerequisite courses (qualified students may substitute advanced courses with departmental permission, in order to include more elective courses in their program):

(a) Mathematics and/or Statistics—9 semester hours selected from Math 31, 2, 51, 52, 111; Stat 91, 97, 110, 118, 198.

(b) Natural Sciences—6 to 8 semester hours selected from BiSc 11–12; Chem 1–12; Geol 1–2; or Phys 1, 2.

(c) Social Studies—12 semester hours selected from Anth 1–2; Econ 1–2; Geog 51, 52; PSc 4 or 5, 6; Psyc 1, 5–6; or Soc 1, 2.

3. Required courses in the major (48 semester hours):

(a) BiSc 140 (four semester hours).

(b) eight semester hours selected from BiSc 101, 102, 103, 108, 109, 110, 111, 115, 118, 123, 124, 125, 127, 135, 141, 143, 144, 145, 146, 149, 150, 161, 167, 185, 208, 210, 211, 237, 242; Chem 22, 50, 122, 151–52, 153–54; Geol 5, 125, 128, 141, 147, 163, 181, 272; Phys 6, 14, 15, 16, 27–28.

(c) 30 semester hours in courses selected from *two* departments in the following—Anth 151, 152, 170, 186, 263, 267; Econ 101, 102, 136, 157, 158, 161, 199, 237; Geog 127, 132, 135, 140, 142, 144; PSc 103, 104, 108, 125, 146, 151, 155, 196; Psyc 104, 144, 151, 156; Soc 126, 127, 128, 151, 152, 181.

(d) Envr 151–52 (6 semester hours).

Bachelor of Science with a major in Environmental Studies (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.

2. Prerequisite courses (qualified students may substitute advanced courses with departmental permission, in order to include more elective courses in their program):

(a) Mathematics and/or Statistics—9 semester hours selected from Math 31, 32, 51, 52, 111; Stat 91, 97, 110, 118, 198.

(b) Natural Sciences—12 to 16 semester hours selected from BiSc 11–12; Chem 11–12; Geol 21–22; Phys 1, 2. Either BiSc 11–12 or Chem 11–12 must be selected.

(c) Social Studies—12 semester hours selected from Anth 1–2; Econ 1–2; Geog 51, 52; PSc 4 or 5, 6; Psyc 1, 5–6; Soc 1, 2.

3. Required courses for the major (48 semester hours):

(a) BiSc 140 (4 semester hours).

(b) 20 semester hours selected from BiSc 101, 102, 103, 108, 109, 110, 111, 115, 118, 123, 124, 125, 127, 135, 141, 143, 144, 145, 146, 149, 150, 161, 167, 185, 208, 210, 211, 237, 242; Chem 22, 50, 122, 151–52, 153–54; Geol 5, 125, 128, 141, 147, 163, 181, 272; Phys 6, 14, 15, 16, 27–28.

(c) 18 semester hours selected from Anth 151, 152, 170, 186, 263, 267; Econ 101, 102, 136, 157, 158, 161, 199, 237; Geog 127, 132, 135, 140, 142, 144; PSc 103, 104, 108, 125, 146, 151, 155, 196; Psyc 104, 144, 151, 156; Soc 126, 127, 128, 151, 152, 181.

(d) Envr 151–52 (6 semester hours).

The science and social studies courses listed under 3(b) and 3(c) above must b taken in not more than *three* departments.

In choosing elective courses for both the Bachelor of Arts and Bachelor Science degree programs, students are reminded that permission of the Dean Columbian College of Arts and Sciences and the Committee on Environmen Studies is necessary to take courses not offered by Columbian College of Arts a Sciences, and that a maximum of 12 semester hours of such courses may be take The following may be of interest to the environmental studies major: BAd 1 171, 172, 173, 174, 201, 203; *CE 194, 197; HKLS 152; U&RP 153, 201, 205. T permission of the instructor, the department chairman, and the Dean of the School Government and Business Administration is necessary to take graduate cours (numbered 201 and above) in that School.

SECOND GROUP

151–52 **Senior Seminar in Environmental Studies** (3–3)

Limited to majors in Environmental Studies. Directed reading and d cussion of contemporary environmental problems.

Experimental Humanities†

Professor C.C. Mondale (*Director*)
Associate Professor **R.S. French**
Lecturer G.H. Williams

EXPERIMENTAL HUMANITIES

First Group

4 **Politics and Values** (3)

A freshman course; limited enrollment. Students will be housed in Th ton Hall. Field-study and case-study of value conflicts implicit in selec political issues involving federal policy and legislation. Concurrent re tration in a special section of PSc 4 required. Students registering Hum 4 in the fall semester will be required to register for Hum 6 in spring semester. Admission by permission of instructor. (Fall)

6 **Politics and Values** (3)

(Formerly Contemporary Political Imagination)

Continuation of Hum 4. Concurent registration in a special section PSc 6 required. Prerequisite: Hum 4. (Spring)

* See the *School of Engineering and Applied Science Catalogue* for civil engineering courses.
† Administered by the Division of Experimental Programs.

*26 **Environmental Issues** (3) French, Langran, Schiff

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Spring)

37 **Computers and Society** (3) Ireland

(*Formerly Computer Technology and Social Issues: the Search for New Alternatives*)

Introduction to history and nature of the computers, to their contemporary uses and to ethical and social issues related to their development (e.g., artificial intelligence; dangers to privacy and freedom). Instruction in elementary programming. (Spring)

40 **Washington, D.C., Culture and Politics** (3) French and Interdisciplinary Team

An all-university course designed primarily for freshmen and transfer students. Major facets of metropolitan life, past and present, analyzed by faculty, students, and community leaders. (Fall)

51–52 **Individuality and Community** (3–3) Mondale, Poppen

(*Formerly The Individual and the City*)

Examination of contemporary patterns of coming-of-age and of community, and of value issues involved in electing among them. Team-taught by a humanist and a social scientist. First semester based in the classroom in preparation for second semester based in the field. Admission by permission of instructor. (Academic year)

72 **Language of Cinema** (3) Kernan

Introduction to cinema as language through analysis of the components of film structure—camera, editing, sound, movement, music, dialogue and mise-en-scene. Class work includes readings, visual communication exercises and a final project. Admission by permission of instructor. (Spring)

91–92 **The Creative Process** (3–3) Claeyssens and Interdisciplinary Team

The process of invention in the arts. Professors of drama, dance, film, art and English participate. Examination of documents in which artists in all fields discuss work in process. Exchange with practicing artists through visits to rehearsals and studios and through discussion with visiting artists and critics. (Academic year)

Second Group

101–2 **Supervised Field-Study** (6–6) French

Community-based projects supervised by appropriate faculty. Juniors and seniors admitted by permission of instructor. Prerequisite to Hum 102: Hum 101. (Hum 101 and 102—fall and spring)

171–72 **The Legal Process** (3–3) Nash,† Wiliams‡

The function which law plays in society and the nature of the legal process. Examination of the societal assumptions and values that mold the law.

* Offered jointly by the Division of Experimental Programs and the departments of biological sciences and geography and regional science.

† Jo Carole Nash, Jr., is Professor of Law in the University's National Law Center.

‡ Howard Williams is Lecturer in Law in the University's National Law Center.

Emphasis upon institutions that make up the law—the courts, administrative agencies, legislative bodies, and executive agencies. Open only to juniors and seniors by permission of instructor. (Academic year)

Schmidt, Parke

174 **Science and Values** (1 or 3)

Study of the effects of scientific knowledge and technology on social institutions and the image of man, of the question of ethic and morality in science, and of the science of values. Admission by permission of instructor. (Spring)

Altman

192 **Health Policy Issues of the 1970s** (3)

Study of U.S. health care delivery system and of issues involved in federal and state attempts to introduce more structure into that system. Analysis of present-day costs and benefits; trends in the supply of health care providers; future of national health insurance and of health maintenance organizations; policy issues presently under debate. (Spring)

Martinez

194 **Washington, D.C., Spanish-Speaking Community** (3)

Examination through field-study of patterns of social and political participation on the part of the local Spanish-speaking population. Analysis of selected aspects of community cultures and structures and review of the history of the Spanish-speaking in Washington. Planned in cooperation with agencies serving the Latino communities. (Spring)

SERVICE–LEARNING EXPERIMENTAL HUMANITIES

Second Group

Willia

151 **Urban Legal Services** (5)

Fieldwork and academic study of the urban legal system. Role of the urban legal system in promoting humanistic values and enhancing social change. Admission by permission of instructor. (Fall and spring)

Nashm

152 **Human Resource Issues in Education** (6)

Exploration of the effects of education on society and vice versa; opportunities for experience, study, and service in public, private, museum, hospital, and community education centers. Admission by permission of instructor. (Fall and spring)

McC

153 **Issues in American Health Care** (6)

(Formerly five credits)

Field work combined with academic study of present American health care system and its problems: cost, quality of care, delivery of health care, ethical issues, health education, consumer issues, etc. Field-placements (12-20 hours a week) in appropriate health-related activities. Admission by permission of instructor. (Fall and spring)

Moo

154 **Independent Study** (3 or 6)

Fieldwork combined with academic study, involving field-placements (20 hours a week) and complementary academic program of study, under the supervision of an appropriate faculty member. Students must "contract" with the agency, the faculty member, and the Service-Learning program. Admission by permission of instructor. (Fall and spring)

155 **The Arts and their Audiences** (6) **Garner**

Studies in the purpose and operation of the arts organizations in Washington. Weekly seminars and placement in an internship in an arts organization. Discussion topics focus on the process of communication between artists and the public, the government, and the business community. Open to students with a demonstrated interest in the arts and the maturity to perform in a responsible position in an arts organization. (Fall and spring)

Forensic Sciences

Professors T.P. Perros, A.H. Desmond, R.C. Allen (*Chairman*), J.E. Starrs, T.F. Courtless, Jr.
Professorial Lecturers A.H. Kaplan, I.W. Conrad, B. White, R.C. Froede, C.J. Stahl III, J.G. Zimmerly, D.A. Crown
Adjunct Professor C.G. McWright
Associate Professor E.S. Sirulnik (*Visiting*)
Associate Professorial Lecturers I.M. Sopher, T.F. Kelleher, Jr., L.R. Goldbaum, H.M. Silverberg, R.W. Hertzog, R. Brunelle, M.G. Dixon, D.D. Garner, R.E. Triplett, F.B. Johnson
Assistant Professors N.T. Lappas, W.F. Rowe
Assistant Professorial Lecturers C.L. Killion, R. Golten, J.S. Johnson, K.E. Melson, I.G. Peniston, J.D. Kogan, S.E. Brown, J.T. Wieseman

Master of Forensic Sciences.—Prerequisite: a bachelor's or a graduate degree from an accredited institution of higher learning and academic or professional experience in the behavioral, biological or physical sciences, law, medicine or law enforcement. Required: the general requirements pages 95–102. The program of study consists of 36 semester hours of graduate-level courses, or, if a thesis is required, the program consists of 30 semester hours of graduate-level courses plus a thesis (equivalent to 6 semester hours). The program of study must include ForS 220 if the student does not have a background in the forensic physical sciences, and ForS 224 if the student has no prior academic training in law. In addition, the student is required to select the following course work: (1) at least 9 semester hours in the forensic physical sciences selected from ForS 201, 202, 203, or 204; (2) at least 6 hours in forensic medicine selected from ForS 214, 260, 261, 262, 263, 264, 266, 267, or 269; (3) at least 6 hours in law and the administration of justice selected from ForS 225, 227, 228, 229, 231, 232 or 251; (4) the remaining semester hours must be selected in consultation with the adviser so that each program of study includes at least 21 hours selected from the forensic physical sciences, forensic medicine, the physical and natural sciences (including the basic medical sciences), and thesis research. Other course work may be selected from the behavioral sciences, law, management science or forensic sciences. All candidates are required to pass a written Master's Comprehensive Examination. There is no tool requirement.

Master of Science in Forensic Science.—Prerequisite: a bachelor's or a graduate degree from an accredited institution of higher learning and academic or professional experience in the biological or physical sciences.

Required: the general requirements pages 95–102. The program of study consists of 36 semester hours of graduate-level courses, or, if a thesis is required, the program consists of 30 semester hours of graduate-level courses plus a thesis (equiva-

lent to 6 semester hours). Individualized programs of study will be developed to meet the career objectives of each student. Each such program of study must include ForS 224 if the student has no prior academic training in law, plus at least 6 semester hours in law and administration of justice selected from ForS 225, 227, 228, 229, 231, 232 or 251. In addition, students will normally take at least 9 semester hours of laboratory course work, plus an internship, or thesis research in their areas of special interest. The remaining semester hours must be selected from approved courses in the forensic sciences, biological and physical sciences, management science, law or the basic medical sciences. All candidates are required to pass a written Master's Comprehensive Examination. There is no tool requirement.

Master of Arts in Special Studies (Criminal Justice).—Prerequisite: a bachelor's or a graduate degree from an accredited institution of higher learning.

Required: the general requirements pages 95–102. The program of study consists of 36 semester hours of approved graduate-level courses drawing upon the forensic sciences, law, criminology, management science, sociology, and psychology. A typical program of studies will include: ForS 214, 220, 224, 225, 228, 229, 231, and 232; Pharm 115 *(Drug Abuse Education);* Soc 263, *(Seminar: Law and Society),* and 231 *(Sociology and the Youthful Offender);* and Mgt 207 *(Human Behavior in Organizations).* All candidates are required to pass a written Master's Comprehensive Examination. There is no tool requirement.

The interdisciplinary programs leading to the degrees of Master of Forensic Sciences and Master of Science in Forensic Science may include course work from the School of Government and Business Administration, from the National Law Center, from the School of Medicine and Health Sciences, and graduate courses in the behavioral, biological and physical science departments of the University. Students work closely with their advisers in setting up a program that meets their interests, needs, and background knowledge. The Department of Forensic Sciences is affiliated with the Armed Forces Institute of Pathology in a program of mutual exchange among students, courses, and facilities. For further information, contact the Department of Forensic Sciences.

THIRD GROUP

Garner, Lapp

201 Forensic Serology (3)

(Formerly Serology, Microscopy, Mineralogy)

Fundamental analysis of blood grouping tests and of those materials primarily identified using the microscope. Specific procedures and techniques utilized in forensic serology—from indicative color tests to blood enzyme classifications and microscopic analyses of hairs, fibers, and reproductive cells. Limitations of the expert in determining blood and human secretor grouping, and natural and synthetic fiber classification, with subsequent interpretations for courts. Laboratory exercises. (Fall)

Perros, Ke

202 Instrumental Analysis (3)

Principles and application of various instrumental methods to the examination of criminal evidence, including chromatographic and spectrometric techniques and mass spectrometry. Laboratory exercises. (Spring)

Crown, Brus

203 Examination of Questioned Documents (3)

Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture and fiber analysis; studies of paper and methods of examination of questioned documents. Laboratory exercises.

204 **Firearms and Tool-mark Identification** (3) Brunelle, Rowe

Study of methods for identifying firearms, cartridge casings, tool-marks, tire marks, and footprints. Laboratory exercises. (Spring)

*214 **Forensic Psychiatry** (3) Allen, Silverberg

Introduction to the constructs of dynamic psychiatry, psychiatric treatment and the nomenclature of mental disorders. Consideration of expert testimony, direct examination and cross-examination in hospitalization and criminal cases. (Fall and spring)

220 **The Crime Lab, the Forensic Scientist and the Criminal Lawyer** (3) Starrs, Melson, Lappas, Rowe

Survey of the forensic physical sciences; qualifications and preparation of the expert witness, and his role in court in criminal and civil cases; operation and functioning of the crime lab. (Fall and spring)

224 **Introduction to Criminal Law Procedure, Evidence and Legal Methods** (3) Starrs, Golten, Brown, Wieseman

Principles of criminal law and procedure, preparation and presentation of evidence, examination of witnesses, and the methods of legal research. (Fall and spring)

225 **Advanced Criminal Evidence** (3) Starrs, Kogan

Study of procedural rules affecting the collection and use of physical evidence, with emphasis on court opinions defining the rules of search and seizure and admissibility of evidence. Prerequisite: ForS 224 or equivalent experience. (Spring)

227 **Advanced Criminal Procedure** (3) Starrs, Peniston

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Prerequisite: ForS 224 or equivalent experience. (Fall)

228 **Administration of Criminal Justice** (3) Allen, Sirulnik, Peniston

Consideration and analysis of selected advanced problems in the administration of criminal justice. Emphasis on the role and professional responsibilities of prosecutor and defense counsel and on developmental trends in the law. Prerequisite: ForS 224 or equivalent experience. (Fall)

*229 **The Police and the Community** (3) Allen, Courtless

Problems and potential of contemporary urban law enforcement; the role and perspective of the police officer. (Spring)

*231 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3) Courtless

Role which knowledge of crime causation may play in assessing devices to control deviant behavior; factors related to criminal behavior; current causal theories. (Fall)

* May also be taken through the National Law Center, with permission of the Dean of the National Law Center and of the instructor.

*232 **Law and Criminology II: Society's Responses to the Criminal Offender** (3) Courtless

Study of punitive, mechanical, and correctional approaches to offenders. Emphasis on changing responses to criminal and delinquent behavior, and research on effectiveness. (Spring)

*241 **Food and Drug Law** (3) Kaplan

The Federal Food, Drug, and Cosmetic Act, and related laws. Consumer, government, and industry viewpoints. (Fall)

251 **Moot Court** (3) Kogan

Students will prepare and present direct testimony and be cross examined by an experienced trial attorney in simulated courtroom setting. Class discussions of problems, techniques. Lectures on discovery, admissibility of scientific evidence, chain of custody, use of notes, etc.

254 **Seminar: Selected Topics in the Forensic Sciences** (3) Crown, Brunelle

Exploration of selected current issues in research, investigation, and law

260 **Introduction to Human Physiology and Pathology** (3) Froelich

Introduction to physiology and pathology of the human body; emphasis on medical terminology. Basic understanding of the body functions in health and disease. (Fall)

261 **Introduction to Forensic Pathology** (3) Stahl, Hertzog, Thompson

Terminology and scientific techniques used in medicolegal investigations sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma. (Fall)

262 **Current Trends in Forensic Pathology and Forensic Odontology** (3) J. Johnson

Emphasis on (1) the relationship among law, medicine, and law enforcement; and (2) the advancement of forensic knowledge. (Fall) Staff

263 **Seminar: Law, Medicine, and Forensic Sciences** (3)

Emphasis on the introduction of forensic science data/evidence in civil and criminal cases. (Spring) Zimmerman

264 **Medical Jurisprudence** (3)

Legal problems inherent in the practice of medicine. Laws regulating health personnel and health industry. Emphasis on professional liability F. Johnson

267 **Histochemistry** (3)

(Formerly Applications of Histochemistry to the Forensic Sciences)

Chemical and physical methods for the localization, identification, characterization of materials under the microscope, including carbohydrates, enzymes, lipids, minerals, pigments, and proteins. (Spring) Triplett

268 **Photography in the Forensic Sciences** (3)

Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. Laboratory fee, $25.

* May also be taken through the National Law Center, with permission of the Dean of the National Law Center and of the instructor.

269 **Forensic Toxicology** (3) Goldbaum, Lappas

Analytical procedures used for the detection of drugs, poisons, and toxic agents in biological specimens. Admission by permission of instructor. (Spring)

271 **Advanced Forensic Serology** (3) Garner, Lappas

(Formerly Forensic Serology)

Advanced techniques in forensic serology and enzymology. Emphasis on practical laboratory examinations and classifications of dried blood stains. Among systems presented are ABO and subgroups, MN, rhesus, and phosphoglocumutase erythrocyte acid phosphatase, and adenylate kinase isoenzymes. Laboratory fee, $25. Prerequisite: ForS 201, or permission of instructor. (Spring)

272 **Advanced Forensic Toxicology** (3) Lappas

Lectures, student seminars, laboratory demonstrations and exercises dealing with advanced laboratory techniques and other topics of current interest in forensic toxicology. Prerequisite: ForS 269 or permission of instructor. Laboratory fee, $25. (Spring)

*281–82 **Biomedical Instrumentation** (4–4) Staff

(Formerly Advanced Instrumental Analysis [3–3])

Same as Bioc 225–26, Micr 241–42 and Phys 223–24. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification and quantification of materials of interest to biomedical and forensic scientists. Laboratory fee, $50. (Academic year)

295 **Research** (arr.) Staff

Open to qualified Master's degree students. Research on problems approved by the Chairman of the Department or academic adviser, under the supervision of an appropriate staff member. Laboratory exercises in those methods in principal use in crime laboratories. (Fall and spring)

298 **Forensic Sciences Practicum** (4) Lappas

Open to qualified master's degree candidates. Internship experience in a crime laboratory or criminal justice agency, under supervision of an appropriate staff member. Weekly seminar held to review, discuss and expand the internship experience. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

French

See "Romance Languages and Literatures."

* An interdisciplinary course offered by the departments of biochemistry, forensic sciences, microbiology, and physiology.

Genetics—Graduate Study

COMMITTEE ON GENETICS

S.O. Schiff (*Chairman*), R. Crystal, R.F. De Giovanni-Donnelly, G.S. Edwards, W.G. Flamm, T.B. Friedman, R.C. Gallo, D. Gillespie, J.C. Houck, C.B. Jacobson, K. Krell, W.M. Leach, C.R. Merril, W.G. Nash, S.J. O'Brien, P.O. Perryman, J.C. Petricciani, J. Schlom, S.J. Smith-Gill, G. Todaro

The Graduate School of Arts and Sciences offers an interdepartmental program leading to the degrees of Master of Science and Doctor of Philosophy in the field of Genetics. This program is directed by a committee whose members are drawn from the departments of biochemistry, biological sciences, child health and development, microbiology, obstetrics and gynecology and pharmacology; and from federal government agencies—the Bureau of Radiological Health, the National Institutes of Health, the National Institute of Mental Health and the Food and Drug Administration.

A baccalaureate degree is required for admission to the degree program. The undergraduate program must have included the following: 8 semester hours each in biology, inorganic chemistry, and organic chemistry; 6 semester hours in physics; and 6 semester hours of English composition and literature. While not required for admission, courses in embryology, genetics and mathematics are strongly recommended.

Master of Science in the field of Genetics.—Required: the general requirements, pages 95–102. The 30 semester hours required in this program must include Gnet 201–2 and Gnet 299–300. The remaining 20 semester hours of course work are to be selected, with the approval of the Committee on Genetics, from the departmental courses listed below. The tool requirement may be met by the satisfactory completion of an approved course in biostatistics or the passing of a foreign language reading examination.

Doctor of Philosophy in the field of Genetics.—Required: the general requirements, pages 95–97, 102–104. The program of study must include Gnet 301–2, 8 to 10 semester hours of biochemistry, 6 to 8 semester hours of cell biology, 10 to [illegible] semester hours of genetics, and 2 or 3 semester hours of statistics. These courses may be selected from the departmental listings on pages 318–19. The tool requirement may be met by the satisfactory completion of an approved course in biostatistics or the passing of a foreign language reading examination, preferably in French or German.

GENETICS

Third Group

201–2 Advanced Problems in Genetics (2–2)
Gnet 201: lecture, seminar. Gnet 202: individual study with each member of the Committee on Genetics. Required of all master's degree candidates in the field of Genetics. (Academic year)

225 Genetic Aspects of Development (2)
Aspects of genetic control and biochemistry of development in a variety of organisms. Prerequisite: a basic genetics course. (Spring)

295 **Research** (arr.) **Staff**

Open to qualified master's degree students. Research on problems approved by the Committee on Genetics. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) **Staff**

(Academic year)

Fourth Group

301–2 **Advanced Problems in Genetics** (2–2) **Staff**

Gnet 301: lecture, seminar. Gnet 302: individual study with each member of the Committee on Genetics. Required of all students preparing for the Doctor of Philosophy general examination whose field of study is Genetics. (Academic year)

398 **Advanced Reading and Research** (arr.) **Staff**

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ANATOMY

203 *Human Embryology* (1)
256 *Human Genetics* (1)
258 *Cytology* (3)
260 *Electron Microscopy in Cellular Biology—Lecture* (1)
261 *Electron Microscopy in Cellular Biology—Laboratory* (2)

BIOCHEMISTRY

221–22 *General Biochemistry* (4–5)
224 *Biochemistry of Enzymes* (1)
227 *Biochemistry Seminar* (1)
232 *Proteins and Amino Acids I* (1)
233 *Proteins and Amino Acids II* (1)
241 *Isotopes* (3)
266 *Biochemical Genetics and Inherited Metabolic Diseases* (1)

BIOLOGICAL SCIENCES

Biology

108 *Organic Evolution* (3)
111 *Introductory Microbiology* (4)
115 *Cytology* (4)

118 *Advanced Cytology* (3)
122 *Cell Biology I: Molecular and Subcellular Biology* (3)
123 *Cell Biology II: Cell Biochemistry* (3)
124 *Cell Biology II: Cell Biochemistry Laboratory* (1)
127 *Genetics* (3)
128 *Genetics Laboratory* (1)
129 *Cell Biology III: Cell Physiology* (3)
130 *Cell Biology III: Cell Physiology Laboratory* (1)
138 *Advanced Genetics* (3)
167 *Radiation Biology* (3)
206 *Seminar: Radiation Biology* (3)
207 *Seminar: Origin of Life* (3)
220 *Seminar: Cell Physiology* (3)
222 *Seminar: Topics in Molecular Biology* (3)
227 *Seminar: Genetics* (3)
248 *Analysis of Development* (3)
249 *Seminar: Developmental Biology* (3)

Zoology

145 *Introduction to Vertebrate Embryology* (4)
146 *Experimental Developmental Biology* (4)

MICROBIOLOGY

211 *Microbiology* (4)
214 *Tissue Cell Culture and Somatic Variation* (4)
229 *Immunology* (3)
230 *Immunology Laboratory* (2)
231 *Immunobiology* (1)
233 *Biology of Viruses* (2)
234 *Biology of Viruses—Laboratory* (2)
258 *Microbial Genetics* (2)
260 *Cellular Immunology* (1)

OBSTETRICS AND GYNECOLOGY*

391 *Cytogenetics* (1)
392 *Reproductive Genetics* (1)
395 *Gametogenesis* (1)
399 *Medical Genetics* (1)

PHARMACOLOGY

203 *Fundamental Principles of Pharmacology* (2)

* See the *School of Medicine and Health Sciences Catalogue.*

256 *Molecular Pharmacology* (2 or 3)
258 *Cancer Chemotherapy* (1)

PHYSIOLOGY

201 *Physiology* (8)

STATISTICS

91 *Principles of Statistical Methods* (3)
117 *Analysis of Variance* (3)
127 *Statistics for the Biological Sciences* (3)
153–54 *Mathematical Models in Population Genetics* (3–3)

Geography and Regional Science

Professor M. Gordon (*Chairman*), F. Belaunde-Terry (*Visiting*)
Professorial Lecturers J.W. Nystrom, J. Baclawski, J. Pickard
Associate Professor J.C. Lowe
Associate Professorial Lecturer P. True
Assistant Professors E.O. Pederson, K.J. Langran
Assistant Professorial Lecturers D.E. Starsinic, S.E.S. Mastran

Bachelor of Arts with a major in Geography (Departmental).—The following requirements must be fulfilled:
The general requirements as stated on pages 77–78, 85–91.
Required courses in the major—24 semester hours of second-group geography and regional science courses, to be chosen in consultation with a departmental adviser.

Master of Arts in the field of Geography.—Prerequisite: a Bachelor of Arts degree with a major in geography from this University, or an equivalent degree.
Required: the general requirements, pages 95–102. The minimum requirement consists of 30 semester hours of approved course work including a thesis; with the approval of the department, a student may elect a program of study without a thesis. A Master's Comprehensive Examination in three fields is required. Candidates must fulfill the tool requirement by either passing a reading knowledge examination in one foreign language or satisfactorily completing the tool requirement of 6 semester hours, selected from Stat 105, 117, 118, 155, 187, 188.

Bachelor of Arts in Education with a teaching field in Geography.—Prerequisite: Education curriculum, pages 81–82.
Required: the geography option and the professional courses listed on pages 125–26.

Master of Arts in Education with a field in Elementary or *Secondary Education specializing in Geography).*—Prerequisite: a bachelor's degree with sufficient concentration in geography to permit successful pursuit of graduate study in the department of geography and regional science. Candidates must be accepted by both the School of Education and the department of geography and regional science.
Required: the general requirements, pages 130–32, including 15 semester hours of graduate courses in geography and regional science.

FIRST GROUP

*26 **Environmental Issues** (3) Langran, Schi

An interdisciplinary analysis of selected aspects of the population questio pollution and human health, urban environmental problems, issues economic growth and development, technology and public policy. (Spring)

Staf

51 **Introduction to Geography** (3)

General survey of the systematic fields of human geography which pla a role in the analysis and interpretation of man-environment relationship in both spatial and ecological contexts. (Fall and spring)

52 **Introduction to Economic Geography** (3) Pederse

Examination of the basic principles which determine the location economic activities on the surface of the earth. (Spring)

SECOND GROUP

Sta

104 **Special Techniques in Cartography** (3)

Descriptive and statistical techniques applied to thematic mapping. Lab ratory fee, $15.

Langra

106 **Introduction to Remote Sensing** (3)

Examination of the principles and applications of remote sensing techniq using aerial photography and LANDSAT imagery. Laboratory fee, $1 (Fall)

L

125 **Transportation Geography** (3)

Consideration of the spatial aspects of interaction, diffusion, and inf mation transfer, including nodal activity and hierarchies, network geom try, gravity models, and diffusion processes. (Spring)

Peder

126 **Economic Geography** (3)

Theories concerning the location of economic activities. Exercises in co puter-oriented locational analysis. Prerequisite: Permission of instruct

Staf

127 **Population and Settlement** (3)

Patterns of world population; factors contributing to population pressu growth, and migrations. (Fall)

Lan

132 **Resource Management and Conservation** (3)

Principles and practices in effective utilization of resources in the U States and selected areas; public policies relating to conservation; envir mental systems, perception, and impact studies. (Fall)

Lan

134 **Geography of Water Resources** (3)

Analysis of the spatial pattern of water resources in the United St problems associated with current and future requirements; political cision-making processes and problems of governmental organizatio intergovernmental arrangements.

* Offered jointly by the Division of Experimental Programs and the departments of biological and geography and regional science.

135 **Resources and Environmental Quality** (3) Langran

Analysis of the spatial pattern of resources; emphasis on the problems of international river basin and ocean resource management. (Spring)

139 **Geographic Perspectives on Current World Problems** (3) Nystrom

Consideration of the impact of contemporary changes in national resources and populations on political communities. (Fall and spring)

140 **Urban Geography** (3) Pederson

Analysis of the internal spatial structure of cities; emphasis on explaining patterns of location within the city. (Fall)

141 **Urban Settlement** (3) Pederson

Distribution of urbanization on the surface of the earth; processes which lead to urbanization; theories which can be used to analyze the location of cities. (Spring)

142 **Urban Environments** (3) Lowe

Consideration of the climatic, hydrological, and other selected aspects of the physical geography of the city as well as of the nature, organization, and spatial patterns of urban delivery systems.

143 **Social Geography** (3) Lowe

Consideration of behavioral aspects of geography incorporating spatial cognition, spatial behavior, social space, migration processes, and conflicts in spatial decision-making.

144 **Environmental Adaptation** (3) Lowe

Consideration of the man-environment relationship; emphasis on bio-climatological responses, disease ecology, nutritional demands, land capabilities, artificial environments, and environmental perception.

145 **Cultural Geography** (3) Langran

Analysis of the relationships between culture and environment; emphasis on spatial and ecological considerations.

146 **Political Geography** (3) Pederson, Langran

Analysis of the interrelationships between the political community and the human and physical environment. (Fall and spring)

161 **Latin America** (3) Gordon

Examination of spatial characteristics of physical and cultural phenomena in Middle and South America. (Fall)

164 **Geography of China** (3) Gordon

Survey of the cultural and physical regional patterns of China.

189–90 **Readings in Geography** (arr.) Staff

(Academic year)

198 **Current Geographic Topics** (3) Pickard, Pederson

A consideration of geographic aspects of topical and future problems of society. Topics change each year. Topic for fall: regional development. Topic for spring: urban transportation. May be repeated for credit. (Fall and spring)

THIRD GROUP

*215 **Field Methods in Cultural Ecology: Settlement Patterns in Pre-Columbian Mesoamerica** (3 or 6) Humphrey, Langra

Field and laboratory examination of settlement patterns and sociologic structures in pre-Columbian Mesoamerica and their relationships to ag cultural water-control systems.

221 **Seminar: Cultural Geography** (3) Langra

Study of the noneconomic processes which affect the location of huma activity. Topics to be discussed are environmental perception and eval ation, social definitions of space, and diffusion of innovations. (Fall)

222 **Seminar: Resources and the Environment** (3) Langra

Analysis of the spatial variations and interrelationships of resources and t environment.

223 **Seminar: The Population-Food Balance** (3) Gord

Analysis of spatial problems associated with the dynamics and interac of population growth and agricultural output.

224 **Seminar: Political Geography** (3) Peders

Examination of the political factor in location theory and analysis of t nature of political territories.

225 **Seminar: Transportation Geography** (3) Lo

Analysis of human spatial interaction; emphasis on networks, gr theory, gravity, interaction and potential models, migration models diffusion processes. (Spring)

243 **Seminar: Urban Geography** (3) Lo

Functional processes affecting the evolving morphology and internal s tial patterns of urban phenomena; emphasis on economic factors, beh iorial considerations, and impact of time.

244 **Seminar: Urban Systems** (3) Peder

Examination of central place theory and other theories of urban locat (Spring)

261 **Seminar: Geography of Latin America** (3) Gor

Analysis of man-land relationships in Latin America. (Fall)

265 **Seminar: Geography of the Soviet Union** (3) Baclaw

Physical features, economic geography, natural and energy resources dustries, transportation, agriculture, population trends; emphasis on r lation patterns along borderlands, especially Sino-Soviet border. (Spring)

266 **Seminar: Geography of China** (3)

Physical and economic geography; emerging industries, energy resou transportation system. Emphasis on population distribution and gro regional geography of selected areas. (Fall)

* An interdepartmental course offered by the departments of geography and regional scien anthropology.

287 **Seminar: Problems in Latin American Civilization** (3) Staff

Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. May be repeated for credit. Admission by permission of instructor. (Fall and spring)

295 **Research** (arr.) Staff

May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

Geology

Professors G. Teleki (*Chairman*), G.V. Carroll, F.R. Siegel, A.G. Coates
Adjunct Professors J.W. Pierce, E.G. Kauffman, I.G. Sohn
Professorial Lecturers N. Hotton, D. Appleman, I. Zietz
Associate Professors R.C. Lindholm, J.F. Lewis
Associate Professorial Lecturers W.E. Maloney, M.A. Buzas, J.E. Hazel, A. Geiger, M.D. Turner
Assistant Professorial Lecturers F.J. Collier, T.L. Hughes, E.T. Miller

Bachelor of Arts or *Bachelor of Science with a major in Geology (Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Required introductory course—Geol 21–22.
3. Required courses in related areas—(a) Chem 11–12; (b) Math 30 (for the degree of Bachelor of Arts) or Math 30 and 31 (for the degree of Bachelor of Science); (c) Stat 91; and (d) BiSc 11, *and* Phys 1 or 3 (for the degree of Bachelor of Science).
4. Required courses in the major—Geol 111, 112, 117, 118, 122, 151–52 for both the degree of Bachelor of Arts and Bachelor of Science; Geol 128, 166, 189, 195 for the Bachelor of Science degree only.

Bachelor of Science with a major in Geology—Engineering option (Engineering Geology) (Departmental).—An interdisciplinary curriculum offered by the department of geology and the department of civil, mechanical, and environmental engineering in the School of Engineering and Applied Science. (Students wishing to work toward the degree of Bachelor of Science (Civil Engineering) with a geology option in geotechnical engineering) should consult the *School of Engineering and Applied Science Catalogue.)* The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Required introductory courses—ApSc 57, 58; Chem 13; EE 51; Geol 21–22; Math 30, 31; Phys 1, 2.
3. Required courses in the major: CE 120, 140, 166, 167, 168, 182, 185; Geol 111, 112, 117, 118, 122, 136, 189, 195, and one course chosen from Geol 128, 141, or 163; Math 111, 112; ME 126 or 131; Stat 91 or ApSc 115 or Stat 102.

Master of Science in the field of Geology.—Prerequisite: the degree of Bachelor of Arts or Bachelor of Science, respectively, with a major in geology from this University, or an equivalent degree.

Required, the general requirements, pages 95–102. Master of Science degree candidates must include in their program of study Geol 141, 163, 205, and 272. Geol 299–300 *Thesis Research* is required for both degrees. Candidates must pass

a Master's Comprehensive Examination before submitting their thesis work. A read-
ing knowledge examination in French, German or Russian must be passed before
beginning the thesis work or before beginning the third semester of graduate work.
other languages may be taken with permission of department. With the permission
of the department, candidates in the Master of Science program may substitute
another approved tool subject in lieu of the foreign language requirement.

Master of Science in the field of Geochemistry (an interdepartmental degree offered by the departments of Geology and Chemistry).—Prerequisite: a Bachelor's degree with a major in geology or in chemistry from this University, or an equivalent deg-
Required: the general requirements, pages 95–102, including Chem 111–12, Geol 141, 241, 249; Geol 246 or Chem 213; and Geol 299 300. The Master's Compre-
hensive Examination must be taken before registration for the second half of the thesis work. A reading knowledge examination in a foreign language, approved by the department of geology or chemistry, must be passed prior to beginning the third semester of graduate work or before beginning the thesis work, whichever occurs first.

Master of Science in the field of Engineering Geology.—An interdisciplinary de-
gree offered by the department of geology and the department of civil, mechan-
and environmental engineering in the School of Engineering and Applied Science

Prerequisite: A Bachelor of Science degree in geology or a Bachelor of Science (Civil Engineering) degree from this University or an equivalent degree which in-
include those courses or their equivalents as outlined for the undergraduate require-
ments in the field of geology with the engineering option (engineering geology). With the permission of the department, a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis. (Students wishing to work toward a Master of Science in the field of geotechnics and foun-
engineering should consult the *School of Engineering and Applied Science Cat-*

Required: (a) The general requirements, pages 95–102, (b) geology—at least semester hours to include Geol 128, 141, 163, and 205; (c) engineering and physical science—at least 12 semester hours to be selected from ApSc 211, 213; CE 204, 206, 207, 208, 209, 216, 217, 218, 219, 221, 255, 256, 257, 263, 265, 271, 276; ME 221, 227, 231, 261, 262, EngS 228.

Doctor of Philosophy in the field of Geology.—Required: the general requirements, pages 95–97, 102–104, including passing a reading knowledge examination in an approved foreign language and one other approved tool subject; and the satisfactory completion of the General Examination in three fields, one of which must be petrology, stratigraphy or structural geology.

Research fields: geomorphology, marine geology, mineralogy, paleontology, petrology, sedimentology, stratigraphy and structural geology.

Doctor of Philosophy in the field of Geochemistry (an interdepartmental degree offered by the departments of Geology and Chemistry).—Required: the general requirements, pages 95–97, 102–104, including passing a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 110 and 118, or 91; and the satisfactory completion of the General Examination in two fields, including geochemistry and chemistry.

Bachelor of Arts in Education with a teaching field in Earth Science.—Prerequisite: the education curriculum, pages 81–82.

Required: the earth science option and the professional courses listed on page 119, 126.

FIRST GROUP

1–2 Introductory Geology for Nonscience Majors (3–3)

Lecture (2 hours), laboratory (2 hours). Survey covering the principal

of geology; emphasis on man's effect on the environment. Laboratory fee, $15 a semester. (Academic year)

5 **Environmental Geology** (3) Siegel, Teleki

The relation of man and society to natural environment; population evolution and mineral resources; economic, legal, and political aspects. Laboratory fee, $15. (Fall and spring)

14 **Mineralogy and Petrology for Nonscience Majors** (3) Carroll

(Formerly Field Petrology)

Lecture (2 hours), laboratory (2 hours), field trips. Prerequisite: Geol 1 or permission of instructor. (Spring)

1–22 **Physical and Evolutionary Geology** (3–3) Staff

Lecture and laboratory (5 hours). Principles of geology as a base for further study in geology and related sciences. Laboratory fee, $15 a semester. (Academic year)

ND GROUP

101 **History of Geological Sciences** (3) Teleki

Development of scientific thought; history of geological and related sciences. (Fall)

111 **Mineralogy** (4) Carroll

(Formerly three credits)

Lectures and laboratory. Morphological crystallography and systematic mineralogy. Prerequisite: Geol 1 or 21. Laboratory fee, $15. (Spring)

112 **Crystal Optics** (4) Carroll

Lectures and laboratory. Optical phenomena of crystals and uses of the polarizing microscope. Prerequisite: Geol 111 or Phys 3, or permission of instructor. Laboratory fee, $18. (Fall)

113 **Crystallography** (3) Appleman

Point-group and space-group theory, fundamentals of crystal structure, X-ray diffraction theory and application. Prerequisite: Math 31. Laboratory fee, $15. (Fall or spring)

117 **Petrology** (2) Lewis

Introduction to silicate phase systems; physics and chemistry of crustal and magmatic processes; volcanic processes and products. Prerequisite: Geol 21, 111–12; Phys 1 or equivalent; or permission of instructor. (Spring)

118 **Petrology Laboratory** (2) Lewis

Concurrent registration in Geol 117 required for Geology majors. Prerequisite: Geol 111. Laboratory fee, $18. (Spring)

122 **Structural Geology** (3) Carroll

(Formerly four credits)

Lectures and laboratory. Interpretation of geologic formations on basis of their structures. Prerequisite: Geol 22. (Fall)

123 **Structural Geology Laboratory** (1) Staff

Solution of geometrical problems of structural geology. Prerequisite or concurrent registration: Geol 122 or permission of instructor. Laboratory fee, $10. (Fall)

125 **Marine Geology** (3) Pierce

Lecture and map work. Principles of oceanography and submarine geology: topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: Geol 1–2 or 21–22; or permission of instructor. (Spring)

128 **Geomorphology** (3) Teleki

Lecture (2 hours), laboratory as arranged. Nature and evolution of earth forms; principles of photointerpretation. Prerequisite: Geol 21. Laboratory fee, $15. (Spring)

132 **Economic Geology** (3) Turner (Fall

Genetics and distribution of mineral raw materials and their uses. or spring)

136 **Engineering Geology** (3) Geiger

For students in the School of Engineering and Applied Science. Geological principles and processes and their application to civil and mechanical engineering. Prerequisite: Math 31, Phys 2 or 4; or permission of instructor. (Spring)

141 **Introductory Geochemistry** (3) Siegel

Principles and theories on the abundance, relationships, and distribution of the elements in various rock and mineral species. Prerequisites or concurrent registration: Geol 117 or equivalent; Chem 11–12; Math 30; Phys 1 or 3; or permission of instructor. Laboratory fee, $5. (Fall)

147 **Chemical Geology in the Earth and Ocean Sciences** (3) Siegel

Introduction to geochemical and chemical principles involved in geological systems and their application to contemporary problems in oceanology, pollution, and mineral exploration. Laboratory fee, $12.

151–52 **Invertebrate Paleontology** (3–3) Coates

Lecture and laboratory (5 hours), field trips as arranged. A systematic treatment of the invertebrate fossil groups, emphasis on the macroinvertebrates. Prerequisite: Geol 1–2 or 21–22; or permission of instructor. Laboratory fee, $15 a semester. (Academic year)

154 **Vertebrate Paleontology** (3) Hotton

Lecture (2 hours), laboratory or field as arranged. General features of vertebrate morphology and evolution; problems of paleoecology and adaptation. (Fall) Staff

158 **Micropaleontology** (3)

Systematic and stratigraphic studies of important microbiota; subsurface methods. Special topics. May be repeated for credit with permission of instructor. Laboratory fee, $12. (Spring) Lindholm

163 **Sedimentation** (4)

Lecture (2 hours), laboratory (4 hours), field trips as arranged. Principles of sedimentation, analysis and interpretation of sedimentary pro-

esses and environment, laboratory experiments in the properties of sedimentary particles. Prerequisite: Geol 111 or permission of instructor. Laboratory fee, $15. (Fall)

166 **Principles of Stratigraphy** (3) Coates, Kauffman

Stratigraphic principles and methods. Prerequisite: Geol 151 or permission of instructor. (Fall)

181 **General Oceanography** (3) Maloney

Chemical and physical properties of sea water, movements of water masses, meteorological interrelations, ecology of marine plants and animals. Prerequisite: Math 31 or equivalent, or permission of instructor. (Spring)

189 **Geophysics for Geologists** (3) Zietz

Basic geophysics to assist the geologist mapping and solving geologic problems. Prerequisite: Geol 21–22, Math 31, Phys 1 or 3; or permission of instructor. (Fall)

195 **Field Work** (2) Staff

Weekend field trips. Surveying, geological mapping, and specific field work methods. (Spring)

199 **Undergraduate Research or Reading** (arr.) Staff

Problems approved by the staff. May be repeated once for credit. (Fall and spring)

HIRD GROUP

205 **Seminar in Geology** (3) Staff

Special topics each semester. May be repeated for credit. (Fall and spring)

216 **Sedimentary Petrography** (3) Lindholm

Identification, classification, and interpretation of common sedimentary rocks by means of the petrographic microscope. Prerequisite: Geol 111, 163; or permission of instructor. Laboratory fee, $15. (Spring)

219 **Petrogenesis I** (3) Lewis

The origin of selected igneous and metamorphic rock types. Laboratory fee, $15. (Fall)

220 **Petrogenesis II** (3) Lewis

Laboratory fee, $15. (Spring)

224 **Advanced Structural Geology** (3) Lewis

Rock deformation. Methods of study and the formation of structurally complex rock. Tectonics. Prerequisite: Geol 122 or permission of instructor. (Fall)

241 **Geochemistry** (3) Siegel

Chemical composition and physical properties of sea water, chemical composition and alterations of marine sediments, thermodynamics and bio-

chemical activity in oceans. Methods of analysis and problems of measuring. Prerequisite: Math 31 and permission of instructor. Recommended: Chem 22. Laboratory fee, $18.

243 **Geochemical Prospecting** (3) Siegel

Application of geochemical principles and analyses to the detection of hidden ore deposits. Field trips as arranged. Laboratory fee, $15. (Spring)

246 **Physical Chemistry in Relation to Geologic Problems** (3) Staff

Application of thermodynamics to phase equilibria studies of minerals and rocks.

249 **Seminar: Geochemistry** (2) Siegel (Fall or spring)

Independent topics each semester; may be repeated for credit.

253 **Bioassociational Studies in Paleontology** (3) Hazel

Analysis and interpretation of the distribution of marine animals with emphasis on biogeographic, paleoclimatologic, and biostratigraphic inferences and multivariate techniques. (Fall)

254 **Interpretive Paleontology** (3) Kauffman

Comparative study of form and function in fossil and recent organisms as related to the interpretation of evolution. Prerequisite: Geol 151–52. (Spring)

255 **Population Paleoecology** (3) Buzas

Characteristics of populations applicable to the fossil record. Subject matter includes ecosystem concept, habitat, Hutchinsonian niche, life-death, size-frequency distributions, competitive exclusion principle, spatial distributions, relative abundance and diversity, quantification of communities, biofacies. Prerequisite: Geol 151–52, Stat 91; or permission of instructor. (Fall)

258 **Micropaleontology** (3) Sohn

Systematic studies of important microbiota. Prerequisite: Geol 158 or permission of instructor. (Fall)

266 **Stratigraphy** (3) Coates, Kauffman

Problems in physical and biological stratigraphy. Analysis of major facies types.

272 **Regional Geology** (2) Staff

288 **Geophysics of the Solid Earth** (3) Zietz
(*Formerly Geophysics for Geologists*)

Physical properties and origin of surface features and the earth's interior. Admission by permission of instructor. (Fall)

295 **Research** (arr.)

Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit. (Fall and spring) Staff

299–300 **Thesis Research** (3–3)

(Fall and spring)

OURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ermanic Languages and Literatures

rofessors J.C. King, K. Thoenelt
ociate Professor C. Steiner (*Chairman*)
ociate Professorial Lecturer M.B. Guenther
tructor B.K. Netland
cturers B. Gardner, P. Werres

Bachelor Arts with a major in Germanic Languages and Literatures (Departmental).—The following requirements must be fulfilled:
1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—Germ 1–2, 3–4, 9–10, 51–52; or equivalent.
3. Required courses in other areas—6 semester hours of history, and 6 semester hours in one of the following subjects: art history, music history or philosophy.
4. Requirements for the major—a minimum of 24 semester hours in German courses above the first group, including Germ 179–80; reasonable proficiency in speaking, reading, and writing German.

Master of Arts in the field of Germanic Languages and Literatures.—Prerequisite: Bachelor of Arts degree with a major in Germanic Languages and Literatures from this University, or an equivalent degree.
Required: the general requirements, pages 95–102, including a reading knowledge of French. The program of study consists of (1) 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours) in the field of German literature or linguistics or, with departmental approval, (2) 30 semester hours of approved course work without a thesis.

Bachelor of Arts in Education with a teaching field in German.—Prerequisite: the education curriculum, pages 81–82.
Required: the German option and the professional courses listed on pages 121, 26.

The department of Germanic languages and literatures, through the Consortium of Universities of the Washington Metropolitan Area, Inc., cooperates in a program leading to the degree of Doctor of Philosophy at Georgetown University.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

GERMAN

First Group

Staff

1–2 **First-year German** (3–3)

Fundamental concepts of German culture; essentials of German structure and basic vocabulary; reading of easy prose and conversation. Aural-oral practice in language laboratory. Prerequisite to Germ 2: Germ 1. Laboratory fee, $17.50 a semester. (Germ 1 and 2—fall and spring)

Staff

*3–4 **Second-year German** (3–3)

Introduction to German civilization, selections from modern German prose, continuation and review of German structure, conversation and simple composition. Aural-oral practice in language laboratory. Prerequisite to Germ 3: Germ 1–2 or equivalent. Prerequisite to Germ 4: Germ 3. Laboratory fee, $17.50 a semester. (Germ 3 and 4—fall and spring)

Staff

*9–10 **German Conversation and Composition** (3–3)

(Academic year)

Staff

47 **Beginning German for Reading Acquisition** (3)

For undergraduates and graduate students with little or no German who are interested in acquiring a reading knowledge of German. No academic credit for graduate students. (Fall)

Staff

49 **German Readings for Nonmajor Students** (3)

Primarily for graduate students preparing for reading examinations, undergraduates admitted. No academic credit for graduate students. Prerequisite: Germ 4 or 47, or equivalent. (Spring)

Guenthe

51–52 **Introduction to German Literature—in English** (3–3)

Lecture, recitation, and discussion. Selected readings in German literature from the earliest periods to the present. (Academic year)

Second Group

Thoene

103–4 **Major Themes of German Literature—in English** (3–3)

Lecture and discussion. Topics for 1976–77: Germ 103—the "Faust" theme in German thought and civilization, from Goethe to Thomas Mann; Germ 104—the anti-Faust movement in German thought and civilization from Goethe to Heinrich Böll. (Academic year 1976–77 and alternate years)

Thoene

111–12 **Comparative Studies in Germanic Literatures—in English** (3–3)

Lecture and discussion. Topics for 1977-78: Germ 111—Absurdity and rebellion, loss and rediscovery of the self, from Existentialism back to Enlightenment, selected works of Thomas Mann, Böll, Frisch, Hesse, Strindberg, Goethe and others. Germ 112—Why literature? What is literature? Views and perspectives on the usefulness and uselessness of literature in modern Western societies. From Plato to the 20th century. Selec-

* With permission of instructor, Germ 9 or 10 may be taken concurrently with Germ 4.

works and excerpts from Plato, Aristotle, Horace, Shakespeare, Montaigne, Goethe, Schiller, Heine, Nietzsche, Thomas Mann, Sartre, Camus, Böll and others. (Academic year 1977–78 and alternate years)

125 **Woman in German Literature—in English** (3) Guenther

Victim, catalyst, deity: an examination of selected works of 19th and 20th century German literature attempting to illuminate the peculiar role of woman in an essentially patriarchal artistic tradition. The paucity of genuinely creative female talents is contrasted with the brilliance of such catalytic figures as Bettina Brentano, Marianne von Willemer and Lou Andreas-Salomé. Readings from Goethe, Kleist, Böll, Hesse et al. (Summer)

126 **France and Germany—in English** (3) Thoenelt

Comparative study of two European ways of life as reflected and perpetuated by literature and philosophy. Relevant excerpts and documents from the 16th to the 20th century. (Summer)

131–32 **18th Century German Literature—in German** (3–3) Thoenelt

Enlightenment, Storm and Stress, Classicism. Reading, lecture, and discussion. Central topic: Geist und Tat—or the 18th century concept of literature's formative function in society. (Academic year 1977–78 and alternate years)

141–42 **19th Century German Literature—in German** (3–3) Steiner

Romanticism, Biedermeier, young Germany, poetic realism. Second age of chivalry and *Sehnsucht*, revolution and counter-revolution in thought and literature. Birth and growth of modern nationalism and cosmopolitanism as reflected in the literature of the period. Reading, lecture and discussion. (Academic year 1976–77 and alternate years)

151–52 **20th Century German Literature—in German** (3–3) Steiner

The age of Nietzsche, Naturalism, Impressionism, Expressionism; Kafka, Thomas Mann, Hesse; émigré literature, contemporary drama; authors of Gruppe 47. Reading, lecture, and discussion. (Academic year 1977–78 and alternate years)

161–62 **Studies in Modern German Literature—in English** (3–3) Steiner

Readings of representative writers of modern German prose; lecture and discussion in English.

179–80 **Advanced German Conversation and Composition** (3–3) Thoenelt

Discussions and compositions on literary and cultural topics, readings of newspaper articles, interpretations of selected texts (Gottfried Benn and Thomas Mann), grammar and style studies. (Academic year 1976–77 and alternate years)

Third Group

201–2 **Middle High German** (3–3) King

(Academic year 1977–78 and alternate years)

209–10 **Old High German** (3–3) King

(Academic year 1976–77 and alternate years)

211–12 **History of the German Language** (3–3) King

213–14 **Old Norse** (3–3) Allee
(Academic year 1977–78 and alternate years)

225–26 **Seminar: Linguistics** (3–3) King, Allee
Bibliography, methodology, readings, and research problems.

231–32 **German Classicism** (3–3) Thoeneb
Advanced study and critique of the literature of the Goethe era. The 18th century image of man; literature and society; the regenerative function of aesthetics, and the establishment of criteria for "Kunst" and "Kitsch." (Academic year 1976–77 and alternate years)

251–52 **Seminar: Studies in 20th Century German Literature** (3–3) Steine
Special projects in fiction, drama, poetry and criticism. Topic for 1976–77: *Das deutsche Drama der Gegenwart.* Analysis of *Weltanschauung* and themes in the major dramatic works of Brecht, Durrenmatt, Frisch, Grass, Hochhuth and Peter Weiss. (Academic year 1976–77 and alternate years)

271–72 **Seminar: German Realism** (3–3) Steiner
Analysis of authors, works, genres and literary trends. Topic for 1977–78: *Kritik und Aufbruch.* Investigation of German sociocritical literature from Lessing to Peter Handke.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

SANSKRIT

Second Group

105–6 **First-year Sanskrit** (3–3) Kin
A year course: credit toward a degree at this University given on completion of Germ 106. Language, literature, and culture of ancient India. Essentials of grammar; reading of classical and Vedic texts. Aural-oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Academic year 1977–78 and alternate years)

107–8 **Second-year Sanskrit** (3–3) Kin
A year course: credit toward a degree at this University given on completion of Germ 108. Language, literature, and culture of ancient India. Continuation and review of grammar; reading of more difficult classical and Vedic texts. Aural-oral practice in language laboratory. Prerequisite: Germ 105–6 or equivalent. Laboratory fee, $17.50 a semester. (Academic year 1976–77 and alternate years)

NDINAVIAN

Group

1–82 Beginning Scandinavian (3–3) Netland

Introduction to Norwegian and introductory reading approach to Danish and Swedish. Fundamental concepts of Scandinavian civilization. Scan 81: Norwegian, language and structure; reading, conversation, and composition. Presentation of Scandinavian culture. Scan 82: additional reading, conversation, and composition in Norwegian. Reading approach to Danish and Swedish. Credit will be given for each semester. Aural-oral practice in language laboratory. Laboratory fee, $17.50 a semester. Prerequisite to Germ 82: Germ 81 or equivalent. (Academic year)

3–84 Intermediate Scandinavian (3–3) Netland

Intermediate Norwegian; reading, conversation, and composition. Additional reading in Danish and Swedish. Outlines of modern Scandinavian culture, including a brief introduction to Icelandic. Students will select a special study project within the course framework. Credit will be given for each semester. Prerequisite to Germ 83: Germ 82 or equivalent. Prerequisite to Germ 84: Germ 83 or equivalent. (Academic year)

reek

"Classics."

ealth Care Administration

ofessor L. Gintzig (*Chairman*), M. C. Devolites
rofessorial Lecturers H.L. Hirsh, W.A. Hamrick
ssociate Professors R.R. Bonato (*Research*), P.N. Reeves, K.J. Darr
dunct Associate Professors P.S. Birnbaum, A.J. Schwab, R.L. White
ssociate Professorial Lecturers W.A. Parker, A. Gavazzi, H.R. Wertlieb, C.C. Korrie, A. Duncker, G.E. Morris
ssistant Professors W.H. Guy (*Research*), K.C. Yang (*Research*), R.G. Shouldice, G.J. McHugh
dunct Assistant Professors J.D. Bentley, W.J. Green, Jr., W.J. Landen, P.J. Collier, C.V. Gordon, Jr.
ssistant Professorial Lecturers T.L. Schmidt, N.B. Hadley, W.J. Barry
nstructors P.A. Cleary (*Research*), R. Switalski (*Research*), D.F. Bergwall, C.P. McKelvey
dunct Instructors G.R. DeLisle, S.T. Fisher, F.W. Carter, C.H. Hayes, D.M. Ambrose, R.W. Black, W.C. Parrish

A program of study leading to the degree of *Bachelor of Science in Health Care Administration* is currently being offered only at the Naval School of Hospital Administration. For further information contact the chairman of the department of health care administration.

Programs of study leading to the degrees of *Master of Arts in Health Care Admin*
stration and Post-Masters Graduate Certificate in Health Care Administration, wh
provide preparation for professional practice in the health care services field, a
areas of concentration in health care administration as study fields in progr
leading to degrees of *Master of Business Administration, Master of Public Admi*
stration, Doctor of Business Administration and *Doctor of Public Administration* a
offered by the School of Government and Business Administration (see pages 138–7

SECOND GROUP

Except for HCA 153 and 154, the following second-group courses are limited to st
dents in the Bachelor of Science in Health Care Administration degree progra
at the Naval School of Hospital Administration.

DeLi

108 Survey of Health Economics (3)

Survey of the principles and applications of economic analysis as appli
to the health field. Economic criteria required for cost effectiveness
operations analysis, and resources management.

Schmi

110 Introduction to Health Care Planning (3)

Introduction to health care program and facility planning. Emphasis o
the role and function of planning agencies, estimation of needs, asses
ment of community and facility resources, collection of data, and evalu
tion of program and facility design.

Ha

120 Personnel Relations in Health Care Institutions (3)

Introduction to personnel relations in the health care environment. B
search studies, as they pertain to the concepts of leadership and supervi
subordinate relations in a multidisciplinary organization, evaluated
practical application. Emphasis on employee cooperation, difference
ability and background, and particular problems caused by specific wo
ing conditions.

F

130 Hospital Labor Relations (3)

Introduction to a brief history of unionism, characteristics of
organizations and union movements, and the basic reasons why the
ernment became involved in employer-employee relations. Labor
and National Labor Relations Board decisions studied in terms of
application to health care facilities. Management's role in the colle
bargaining process and the administration of and "living" with colle
bargaining agreements.

Ca

140 Hospital Financial and Material Management (3)

Principles, practices, functions, and objectives of financial and mate
management in support of hospital operations; emphasis on the role
contributions of middle management. Costs and budgetary control
sponsibility accounting, cost-based budgets, purchasing, inventory
trol, distribution, and storage.

C

142 Financial Management in Health Care Institutions (3)

Consideration of the nature, analysis, and interpretation of accoun
data. Cost accounting, budgeting, and internal control techniques
phasis on their use in the management planning and control proces

153 **Survey of Health Care Organization** (3) Parker, Bentley

Introduction to the organization and delivery of health care services in the United States. Emphasis on the structural features of and the resources available to the health care system. (Fall and spring)

154 **Introduction to Hospital Management and Procedures** (3) Parker, Black

Introduction to the structure and management of contemporary American hospitals; emphasis on the organization of hospital departments and on the functions of the department manager. (Fall and spring)

155 **Special Problems in Health Care Management** (3) Hayes

Supervised reading program in which the student is expected to review the literature on a middle-management problem present in contemporary American health care institutions.

159 **Legal Issues in Health Care Administration** (3) Landen

Recognition and comprehension of areas of legal liability in hospital activities. Knowledge and understanding of a wide variety of administrative duties and responsibilities of a legal nature, such as administrative investigations, misconduct and line of duty determinations, administrative discipline and discharge, claims under the Medical Care Recovery Act, Federal Tort Claims Act, and other related matters.

162 **Survey of Hospital Informations Systems** (3) Gordon

Development and discussion of a computerized integrated information system, its effect on the environment, and its use within the organizational system for planning and control. Analysis of actual information systems used in hospitals.

170 **Quantitative Methods in Health Care Administration** (3) Ambrose

Introduction to the application of quantitative methods to the health services industry. Fundamental statistical techniques enabling the student to read, comprehend, critically appraise, and intelligently utilize the growing volume of quantitative research appearing in the health services literature. Familiarization with quantitative procedures applied to analyzing management problems in the operational environment. Emphasis on establishing a fundamental understanding of statistical "ideas" rather than upon manipulating predeveloped formulas.

175 **Analysis in Health Care Administration** (3) White, Bentley, Hayes

Skills, methods, research, and analysis of the middle management problem in health care administration.

180 **Management Case Problems in Hospital Administration** (3) Collier, Parrish

Study of the management functions as applied in the hospital setting. Management case problems in hospital administration areas such as authority relationships, communication barriers, motivation and productivity, and control techniques discussed and analyzed.

190 **Special Topics in Health Care Administration** (3)

Experimental offering at the undergraduate level. (Fall and spring)

THIRD GROUP

202 **Introduction to Health Care Systems** (3) McKelvey, Reev

Lecture and discussion (2 hours), laboratory (2 hours). Introducto
description and analysis of the American health and medical care syste
and the organization, characteristics, and relationships of research, tec
nology, manpower, public and private delivery, and financing mechanis
Survey of major disease problems and their impact on administration a
planning. Medical terminology. (Fall and spring)

203 **Organization and Management of Health Care Institutions** (3) Darr, Hadley, McHug

Lecture and discussion (2 hours), laboratory (2 hours). History a
current character of institutional providers of health care. Functio
organizational structure, and interrelationships of various types of heal
care facilities. Institutional ethics; statistics. Regulation of institution
providers. (Fall and spring)

204 **Management of Health Maintenance Organizations** (3) Shouldi

Basic principles and fundamentals of prepaid group practice plans a
newly forming health maintenance organizations. Emphasis on planni
development, and operation of prepaid plans. (Fall and spring)

205 **Hospital Administrative Practices** (3) Darr, McHu

Lecture and discussion (2 hours), laboratory (2 hours). Organizatio
management, and interrelationships of hospital clinical, support, and
ministrative departments. Analyses of procedures and systems. Hospi
personnel administration. Administrative ethics. Requirements of t
Joint Commission on Accreditation of Hospitals. Prerequisite: HCA
(Fall and spring)

206 **Case Studies in Health Care Administration** (3) Devolites, Birnbaum, McK

Discussion (2 hours), laboratory (2 hours). Intensive qualitative a
quantitative analyses of major problem areas in health care adminis
using the case study method. Cases cover the broad spectrum of he
care delivery and management: plans and operations, personnel, finan
and materiel. Developing and implementing solutions serves as capst
course for health care administration students. Prerequisite: HCA
203, and Mgt 201. (Fall and spring)

207 **Management Analysis in Health Care Institutions** (3) Shouldice, Bergwall, Re

Lecture (2 hours), laboratory (2 hours). Basic investigation and pro
solving techniques, including various methods of collecting, analyzi
porting, and using information that can be made available to administ
of hospitals and other medical care institutions. Field assignments
(Fall and spring)

209 **Health Resources Management** (3) Devolites, Birnbaum, B

Lecture (2 hours), laboratory (2 hours). Introduction to re
analysis and financial management in health care institutions. Estim
of health services demand and resources requirements. Review

analysis of health services operations; reimbursement by the government and other third parties; medical materials and facilities management; sources of funds. (Fall and spring)

210 **Advanced Health Resources Management** (3) Devolites, Bergwall

Development of financial health policies, objectives, and programs. Application of PPBS in the health care field; financial management of multi-unit health care systems; financial aspects of national health programs, prospective rates and regulation of health prices; case studies and field research. (Fall or spring)

212 **Introduction to Health Planning** (3) Reeves, Bergwall, McKelvey

Lecture (2 hours), laboratory (2 hours). Introduction to the history and development of health planning in the United States. Presentation of basic health planning methods and procedures at a project level.

213 **Comparative Health Care Systems** (3) Gintzig

Comparative evaluations of various organizational patterns, functions, and trends in international health care delivery systems. Emphasis on the sources of such differences and significance of the systems to the health care of a nation. (Fall or spring)

214 **Health Systems Planning** (3) Reeves, Bergwall

Advanced planning techniques emphasizing quantative and rational methodology at the health systems level. In-depth discussion of selected critical components of the health planning process. Prerequisite: HCA 212, or permission of instructor. (Fall or spring)

216 **Seminar: Policy in Health Planning** (3) Reeves, Bergwall

Analysis of the legal, political, social, and economic factors in health care planning with emphasis on policy formulation and implementation. Explores the role of societal values in setting health policy. Prerequisite: HCA 212, or permission of instructor. (Fall or spring)

250 **Delivery of Mental Health Services** (3) Morris

Study of the organizations and systems for the delivery of mental health services; emphasis on administration, management, and financial support of treatment and rehabilitation facilities. (Fall)

260 **Introduction to Long-term Care Administration** (3) Wertlieb

Evolution of long-term institutions as a health care delivery sub-system. Comparative evaluation of characteristics of various long-term care institutions; regulation by government. Relationships between the purposes and functions of these institutions and the health care needs of the community are investigated. (Fall)

261 **Seminar: Managing the Long-term Care Institution** (3) Wertlieb

Designed to improve the abilities and effectiveness of health care administrators through a foundation of knowledge and skills in long-term health care facility organization and management. Emphasis on the range of services available in long-term care institutions. Prerequisite: HCA 260, or permission of instructor. (Spring)

265 **Readings in Long-term Care Administration** (3) Staff

Advanced studies in selected aspects of administration of long-term care facilities. May be repeated for credit. (Fall or spring)

267 **Social Gerontology for the Administrator** (3) Dunc

Overview of the social, psychological, and biomedical characteristics older persons. General as well as special circumstances of the elderly w which administrators of health care facilities should be acquainted. (Fall and spring)

270 **Research in Health Care Administration** (3) Gintz

Field research. Primarily for doctoral students; open to other gradu students with consent of instructor. May be repeated for credit. (F or spring)

285–86 **Readings in Health Care Administration** (3–3) Gintzig and St

Supervised readings in special areas or subdivisions of health care ministration and planning. Primarily for doctoral students; open to oth students by arrangement. May be repeated for credit. (Academic ye

287 **Seminar: Health Care Administration and the Law** (3) Hirsh. Da

Primarily for doctoral students; open to other students by arrangeme Analysis of the law and health care administration. Legal duties and sponsibilities, as well as rights of administrators and the health facility, are outlined. Discussion of the legal relationships of facility sonnel, legal aspects of labor relations, and trends in hospital law. (Fall or spring)

288 **Seminar: Field Problem Studies in Health Care Administration** (3) Bergwall, Gintzig. Re

Selected administrative and planning issues and problems arising in he care facility situations. Primarily for doctoral students; open to other dents by arrangement. May be repeated for credit. (Fall or spri

290 **Special Topics in Health Care Administration** (3)

Experimental offering; new course topics and teaching methods. May be peated once for credit. (Fall or spring)

293–94
–95 **Residency I** (3–3–3)

Twelve-month residency, beginning summer, fall, or spring. Work perience under a qualified preceptor, periodic written progress repor a written major report, or a selected field project.

296–97
–98 **Residency II** (3–3–3)

For selected students who take a second twelve-month residency; be summer, fall, or spring.

299–300 **Thesis Research** (3–3)

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.)

Limited to doctoral students preparing for the general examination be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to doctoral candidates. May be repeated for credit. (Fall and spring)

Hebrew

See "Classics."

History

Professors R.H. Davison, R.B. Thompson, F.H. Michael, R.C. Haskett, R.P. Sharkey, H.M. Sachar, R.W. Kenny (*Chairman*), L.W. Brown, P.P. Hill, L.G. DePauw, R. Thornton, L.G. Schwoerer
Professorial Lecturer O. Mayr
Adjunct Professor R.P. Multhauf
Associate Professors C.J. Herber, W.R. Johnson, R.A. Hadley, P.F. Klarén
Assistant Professors A.D. Andrews, S.A. Grant, R.E. Kennedy, Jr., L.P. Ribuffo
Assistant Professorial Lecturer A.L.K. Nelson

Bachelor of Arts with a major in History (Field-of-Study or Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.)

2. Required introductory courses—Hist 39–40, 71–72, or equivalent. Majors may waive one or more of the prerequisite courses by passing departmental examinations, by attaining scores of 600 or above on the College Entrance Examination Board achievement tests, or by good performance on Advanced Placement Examinations. Credit for one or more of the prerequisite courses may be received by superior performance on departmental or Advanced Placement Examinations.

3. Required courses in related areas—(a) either 12 semester hours of an approved foreign language or (b) 9 semester hours in statistics (Stat 53, 98, 105, 113).

4. (a) *Field-of-study major*—Hist 199 (Proseminar), 6 semester hours of third-group courses, including at least 3 semester hours of research seminar, and the passing of the major examination in the senior year. In planning a program, the student, under the guidance of an adviser, should choose courses which will give him a broad understanding of diverse chronological and geographical aspects of the human experience.

(b) *Departmental major*—27 or more hours of second- and third-group courses, including Hist 199, 6 semester hours of third-group courses including at least one research seminar, and 6 semester hours chosen from each of the following fields: I (Europe)—Hist 101, 105, 106, 109, 110, 111, 112, 121, 122, 123, 124, 127, 131, 132, 139, 140, 141, 142, 147, 149, 150, 151, 152, 153, 154, 157, 198; II (United States)—Hist 128, 129, 167, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 185, 186, 197; III (Russia, Asia, Africa and Latin America)—Hist 102, 108, 113, 114, 116, 137, 138, 143, 144, 145, 146, 158, 161, 163, 164, 165, 166, 187, 188, 189, 193, 194, 195, 196.

A pamphlet relating to the major is available in the offices of the Dean of th
Columbian College of Arts and Sciences and in the department of history.

An Honors Program may be chosen by juniors with satisfactory scholastic record
Application to this program must be made before the beginning of the secon
semester of the junior year. Students accepted into the program take a 3-hour semi
in the second semester of the junior year and complete the research requirements f
the history major by preparing the Senior Honors Thesis (Hist 191–92) in the fi
year of undergraduate study.

Master of Arts in the field of Classical Archaeology, Classics, and History (
interdepartmental degree program offered by the departments of Art, Classics, an
History).—Prerequisite: a bachelor's degree with a background in Classical Archa
ology and either Greek or Latin. Applicants from other institutions must presen
scores on the Graduate Record Examination to the Office of the Graduate Scho
of Arts and Sciences.

Required: the general requirements, pages 95–102. The program of study cons
of 24 semester hours of course work (as many as possible should be third-gro
courses) selected in consultation with the appropriate adviser from the departmen
of art, classics and history; plus a thesis (equivalent to 6 additional semester hour
Candidates must pass a reading knowledge examination in French or Germa
All candidates are required to pass a general Master's Comprehensive Examinati

Master of Arts in the field of History.—Prerequisite: a bachelor's degree fr
an accredited college or university with a major in history, or an equivalent degr
high scholastic standing; and approval of the department. Applicants from o
institutions must present scores on the Graduate Record Examination with the A
vanced Test in History and arrange for four persons, preferably former instructo
to send letters or reference forms to the Office of the Gaduate School of Arts
Sciences.

Required: the general requirements, pages 95–102. The program of study cons
of (1) a minimum of 30 semester hours of second- and third-group courses, inclu
Hist 299–300 *Thesis Research*, or (2) a minimum of 36 semester hours of
ond- and third-group courses, including at least two research seminars (6 semes
hours). At least 6 semester hours of each candidate's program must be in
or fourth-group history courses; a maximum of 6 may be in approved courses o
side the department of history. Master's candidates are responsible for arra
with instructors of second-group courses for extra work, in order to receive g
ate credit for such courses. Each student works in two fields of history and
quired to pass a Comprehensive Examination in each.

Doctor of Philosophy in the field of History.—Required: the general require
pages 95–97, 102–104, including the passing of a written examination in two
propriate foreign languages, or one foreign language and an approved tool s
and the satisfactory completion of the General Examination in four fields
mally, each doctoral candidate will work in one major (or general) field of
and three special fields. The major fields include the following: ancient h
medieval Europe, early modern Europe, modern Europe, United States
America, modern Near East, modern Far East, Russia and East Europe. S
fields may vary from the topical (e.g., U.S. social history, European intel
history, etc.) to the chronologically limited fields (e.g., American colonial h
Tudor and Stuart England, etc.). A student may elect one special field outside
department of history if it is relevant to the program.

Bachelor of Arts in Education with a teaching field in History.—Prerequisite
education curriculum, pages 81–82.

Required: the history option and the professional courses on pages 122–23.

Doctor of Philosophy fields of study in International Relations combine w
economics, history and political science.

Departmental Prerequisite: Students are expected to bring to second-group courses appropriate level of background preparation. Ordinarily, this is achieved by successful completion of first-group courses in the same area or by presenting evidence of equivalent preparation. Students lacking such preparation may take second-group courses only with the consent of the instructor.

FIRST GROUP

39–40 European Civilization in Its World Context (3–3) Staff

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present. (Academic year)

71–72 Introduction to American History (3–3) Staff

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from the beginning to 1876. Hist 72: from 1876 to present. (Academic year)

SECOND GROUP

101–2 History of Revolution (3–3) Thompson

(Hist 101 was formerly World Civilizations)

Hist 101: revolution as a theme in world history from ancient times to Luther, Cromwell and Robespierre. Hist 102: revolution and the revolutionary movement in the age of Marx, Lenin and Mao. (Academic year)

105–6 History of Science and Technology (3–3) Multhauf, Mayr

Hist 105: from ancient natural philosophy through the 17th century scientific revolution. Hist 106: from the Industrial Revolution to the 20th century amalgamation of science and technology. Emphasis alternates between science and technology in successive years. (Academic year)

108 The Ancient Near East and Egypt to 322 B.C. (3) Hadley

Survey of Egyptian, Mesopotamian, Anatolian, West Semitic, and Iranian civilizations from the Neolithic period to Alexander's conquest.

109 Early Aegean and Greek Civilizations to 338 B.C. (3) Hadley

Neolithic background: Bronze age—Minoan, Helladic, and Mycenaean civilizations; classical Greek civilization to the Macedonian conquest. (Fall)

110 The Roman World to 337 A.D. (3) Hadley

Prehistoric Italy; rise and decline of the Roman Empire and Latin civilization; cultural, social, and political developments in the Greek world under Roman rule. (Spring)

111–12 Medieval History (3–3) Andrews

Development of the Latin Christian community. Hist 111: 4th to 11th century. Hist 112: 11th to 14th century. (Academic year 1977–78 and alternate years)

113–14 **Byzantium and Its Neighbors** (3–3) Andrew
(Formerly Hist 113 Early Middle Ages [3]*)*
Mediterranean region from fourth to 15th century; Byzantium, Isla
Crusades, advance of the Turks. (Academic year 1976–77 and alt
nate years)

116 **History of Africa** (3)
Survey of political, cultural, and economic development from ancie
times to the present.

121 **The Renaissance in Western Europe** (3) Schwoe
The Renaissance City, concepts of the ideal man and woman, the d
covery of new worlds, Machiavelli, historiography of the period.

122 **The Reformation in Western Europe** (3) Her
Religious, political, and social consequences of the theological upheav
of the 16th century. (Spring)

123–24 **European Intellectual History** (3–3) Kenne
Philosophy, political and economic thought, cultural developments, popu
culture, diffusion of ideas. Hist 123: 17th and 18th centuries. Hist 1
19th and 20th centuries.

*127 **Theories of History** (3) La
Major philosophies of history: Judeo-Christian, idea of progress,
toricism, Hegelian-Marxist dialectic, cyclical (Vico, Spengler, Toynb
and social-scientific (Kant, Weber) views. Contemporary problems of
torical knowledge. (Fall)

128–29 **War and Society: The Anglo American Experience Since 1776** (3) McDo
Interaction of wars, armed forces and defense policies with politics
society in Great Britain and the U. S. since the Revolutionary War
128: from 1776 to 1918. Hist 129: 1919 to the present. (Acad
year)

131–32 **History of Germany** (3–3) He
Political, social, and cultural development. Hist 131: from mid-17th
tury to Bismarck. Hist 132: from William II to present.

137 **U.S.-Soviet Strategic Relations Since World War II** (3) Theo
Survey of U.S.-Soviet global rivalry from World War II to the pr
(Spring)

138 **History of World Communism** (3) Thor
The international communist movement from its beginnings to the
ent. (Not offered academic year 1976–77)

139–40 **World History in the 20th Century** (3–3)
Diplomatic, political, and cultural factors. Hist 139: from the m
the century to the Munich settlement of 1938. Hist 140: from the M
settlement to present. (Not offered academic year 1976–77)

* An interdepartmental course offered by the departments of history and philosophy.

141–42 **History of France** (3–3) Kennedy

Political, social, and cultural development. Hist 141: Old Regime, French Revolution and Napolean. Hist 142: from Napolean to present. (Academic year)

143 **Europe East of the Elbe, 1815–1939** (3) Staff

Poland, the Danube countries, and the Balkans in the 19th and 20th centuries. (Fall)

144 **Medieval Russia** (3) Grant

Russian history from its beginnings to the reign of Peter the Great. (Spring)

145 **Imperial Russia** (3) Thompson

From the reign of Peter the Great to World War I. (Fall)

146 **Soviet Russia** (3) Thompson

The Russian Revolution and Soviet rule to the present. (Spring)

*147 **Economic History of Europe** (3) Sharkey

Economic development since the Middle Ages; emphasis on the period following the Industrial Revolution. Evolution of capitalism and its impact upon the societies of Europe. (Spring)

149–50 **European Diplomatic History** (3–3) Davison

Emphasis on policies and actions of the great powers and their statesmen. Hist 149: 1812 to 1890. Hist 150: since 1890. Students who receive credit for Hist 150 cannot receive credit for Hist 157. (Academic year)

151–52 **History of England** (3–3) Kenny

Development of English civilization and its impact on Western culture. Hist 151: to 1689. Hist 152: since 1689. (Academic year)

153 **Tudor England** (3) Kenny

Aspects of the constitutional, social, intellectual, economic, and religious development of England, 1485–1603.

154 **Stuart England** (3) Schwoerer

Grand Rebellion, Restoration, and Glorious Revolution. The political, religious, intellectual, social, and economic development of England, 1603–1714. (Spring)

157 **20th Century European Diplomatic History** (3) Sachar

The main currents, with necessary 19th century background. Students who receive credit for Hist 157 cannot receive credit for Hist 150. (Fall)

158 **Modern Jewish History** (3) Sachar

A secular history of the Jewish people from the 18th century to the present state of Israel; emphasis on European political, economic, and cultural influences. (Fall)

* An interdepartmental course offered by the departments of history and economics

161 **Revolution in 20th Century Latin America: the Mexican and Cuban Experience** (3) Klarén

Social, economic, and political forces working to undermine the traditional fabric of Latin American society; emphasis on historical roots of revolutionary movements. (Spring)

163–64 **History of Latin America** (3–3) Klarén

Political, socioeconomic, and cultural development. Hist 163: colonial period. Hist 164: national period. (Academic year)

165 **History of Brazil** (3) Klarén

Political, socioeconomic, and cultural aspects from pre-Columbian times to the present.

166 **History of Mexico** (3) Klarén

Political, socioeconomic, and cultural aspects from pre-Columbian times to the present. (Fall)

167 **Man-made America: the Colonial Scene** (3) Haskett

The setting and shape of life in early America. (Spring)

169 **The American Revolution** (3) DePauw

The political, intellectual, social, military, and economic significance of the events leading to the War for American Independence and the adoption of the Federal Constitution. (Fall)

170 **U.S. Early National History** (3) Hill

Political, diplomatic, economic, and social history of the early republic, 1789–1828. (Fall)

171–72 **U.S. Social History** (3–3) Brown

Hist 171: daily life, institutions, intellectual and artistic achievements of the Agrarian Era, 1607–1861. Hist 172: the Urban-Industrial Era from 1861 to present.

173–74 **Afro-American History** (3–3) Brown

The place of Black Americans in the corpus of American history. (Academic year)

175–76 **U.S. Political History** (3–3) Haskett

Hist 175: to the Civil War. Hist 176: Civil War to 1960. (Academic year)

177 **The Ante-bellum South** (3) DePauw

Political, economic, intellectual, social, and cultural characteristics of the American South before the Civil War. (Spring)

178 **Recent U.S. History** (3) Ribuffo

Political, social, and intellectual history from 1890 to the present. (Fall)

*179–80 **U.S. Economic History** (3–3) Sharkey

Process of economic growth from Colonial times to the present. Development of various sectors in the economy and their interdependence. Hist 179: 1607–1865. Hist 180: from 1865 to present. (Academic year)

* An interdepartmental course offered by the departments of history and economics

181–82 **U.S. Diplomatic History** (3–3) Hill

Survey of American foreign relations from the era of the American Revolution. Hist 181: to 1898. Hist 182: 20th century. (Academic year)

185 **History of Women in America** (3) Staff

Survey of the political, economic, social, military, religious, intellectual, and cultural activities of women in America from 1000 A.D. to the present. (Spring)

186 **U.S. Urban History** (3) (Same as AmCv 186) Gillette

Development and characteristics of American cities. (Fall)

187 **History of Modern China** (3) Johnson

China since 1840, particular attention to political developments. (Fall)

188 **History of Chinese Communism** (3) Thornton

Survey of the leadership, ideology, structure, and operation of the Chinese revolutionary movement from its founding to the present. (Fall)

189 **History of Modern Japan** (3) Sigur

Japan's century of modernization—from the Meiji Restoration of 1868 to the present. Emphasis on historical, political, economic, and cultural factors. (Fall)

191–92 **Senior Honors Thesis** (3–3) Staff

Required of and open only to undergraduate honors candidates in history. (Academic year)

193 **History of the Near East** (3) Davison

Byzantine, Arab, Persian, and Islamic backgrounds; rise and decline of the Ottoman Empire; action of European powers in the area; Ottoman breakup into the Turkish Republic and other states. (Fall, odd years)

194 **History of the Modern Near East** (3) Davison, Sachar

Beginning with Napoleon's invasion of Egypt. Development of nationalism and of modern states; impact of the West on culture and institutions; great-power imperialism; crises of Turkish Straits, Suez, Arab-Israeli relations; and other issues. (Fall)

195–96 **History of East Asia** (3–3) Johnson

Civilizations of China and Japan; emphasis on institutional development. Hist 195: beginnings to about 1800. Hist 196: from eve of the modern era to present. (Academic year)

197 **Oral History and Interview Techniques** (4) Staff

Introduction to theory and practice of obtaining and using historical data through recorded interviews. Examination of major published works in oral history. Particular attention to ongoing oral history projects in the Washington area.

198 **Special Topics in History** (3) Staff

Historical perspectives on great issues of past and present. New topic each semester.

199 **Proseminar: Readings for the History Major** (3)
Required of senior history majors. Readings and discussions on major trends in history; representative selections from the classics of historical literature. Students who receive credit for Hist 199 cannot receive credit for Hist 201. (Fall and spring)

THIRD GROUP

Prerequisite to all third-group history courses: the appropriate second-group preparation and consent of instructor.

201 **History and Historians** (3)
Students who receive credit for Hist 201 cannot receive credit for Hist 199. (Fall and spring)

203–4 **Research Seminar** (3–3)
Prerequisite: approval of Department. (Academic year)

205 **Evolution of Nationalism in Eastern Europe** (3)
Formation of national consciousness and emergence of modern East European states after World War I. Developments of the interwar period. Open to qualified undergraduate seniors. (Fall)

206 **Revolution in Eastern Europe** (3)
Transformations of East European states during World War II. Resistance movements, communization, and national self-assertion in the immediate post-Stalin period. Open to qualified undergraduate seniors. (Spring)

207 **Seminar: the Communist Party of the Soviet Union** (3)
Evolution of the Communist movement in Russia. Party origins, growth and organization; intra- and inter-party strife. (Spring)

208 **Research Seminar: History of World Communism** (3)
Prerequisite: Hist 138 or equivalent.

209–10 **Seminar: Ancient History** (3–3)
Prerequisite: Hist 108, 109, or 110; or equivalent. (Academic year)

211–12 **Seminar: Medieval History** (3–3)
Prerequisite: Hist 111–12 or equivalent. Students with working knowledge of Latin may receive Research Seminar credit. (Academic year)

*213 **Comparative Communist Systems I** (3)
Ideological foundations of communism; emergence of the Soviet system; development of the international communist movement to World War II; postwar formation of the Soviet bloc. (Fall)

*214 **Comparative Communist Systems II** (3)
Comparative analysis or major recent ideological trends and political institutions and behavior among ruling and nonruling Communist Parties. (Spring)

* An interdepartmental course offered by the departments of history and political science

215 **Transformation of the Socialist Commonwealth** (3) Petrov
(Formerly Hist 214)
Soviet relations with East European and Asian socialist states from the end of World War II to the Sino-Soviet split. Changes in substance and form in relations among ruling Communist parties. Open to qualified undergraduate seniors. (Summer)

217–18 **Seminar: Russian and Soviet Thought** (3–3) Grant
Prerequisite: Hist 145 or 146, or equivalent. (Academic year)

223–24 **Research Seminar: European Intellectual History** (3–3) Kennedy
Prerequisite: appropriate preparation and permission of instructor.

*225 **History of Washington, D.C.** (3) Brown

228–29 **Research Seminar: Modern Military and Naval History** (3–3) McDonald
Prerequisite: appropriate preparation and permission of instructor. (Academic year)

†231 **Seminar: Sino-Soviet Relations** (3) Michael
Background, development, and status of conflict within the communist movement; emphasis on the role of Chinese communists. Prerequisite: 3 semester hours selected from Hist 187; P Sc 101, 194; or equivalent. (Spring)

237 **Seminar: Soviet Foreign Policy, 1917–1960** (3) Petrov
Concepts and perceptions guiding Soviet relations with the outside world. From the blockade and intervention, through years of isolation, World War II, the Cold War, to "peaceful co-existence" and detente. Open to qualified undergraduate seniors. (Fall and summer)

241–42 **Research Seminar: Modern European History** (3–3) Herber
Prerequisite: appropriate preparation and consent of instructor.

245 **Studies in Revolutionary History** (3) Thompson
(Formerly Research Seminar: Revolutionary History)
Topics for 1977: women and revolution. Open to qualified undergraduate seniors. (Spring)

246 **Research Seminar: Russian History** (3) Thompson
Prerequisite: Hist 145, 146, or consent of instructor. (Fall)

247 **Research Seminar: the Theory and Practice of Modern Imperialism** (3) Sharkey
(Fall)

248 **Reading Seminar: Modern European and Near Eastern History** (3)
Admission by permission of instructor.

249–50 **Research Seminar: European Diplomatic History** (3–3) Davison
Prerequisite: one course chosen from Hist 149, 150, 193, 194; or equiva-

*Offered jointly by the department of history and the American Studies Program
†Departmental course offered by the departments of history and political science

lent. Reading knowledge of one modern language other than Engli
preferably French, German, Russian, or Italian. (Hist 249—fall)

251–52 **Research Seminar: English History** (3–3) Kenny, Schwoe
Prerequisite: Hist 151–52 or equivalent. (Academic year)

261–62 **Research Seminar: Latin American History** (3–3) Klare
Prerequisite: 6 semester hours of undergraduate course work in La
American History. (Academic year)

271–72 **Research Seminar: U.S. Social History** (3–3)
Prerequisite: Hist 171–72 or equivalent.

273–74 **Research Seminar: Materials in Afro-American Culture** (3–3) Brow
Prerequisite: Hist 173–74 or equivalent. (Academic year 1976-
alternate years)

275–76 **Research Seminar: U.S. Political and Colonial History** (3–3) Hasle
Admission by permission of instructor. (Academic year)

†277–78 **Historic Preservation** (3–3) Guthe
The preservation movement and its literature. Review of current
perience, preservation practice and techniques. Emerging aspects of
toric preservation. Examples of historic, cultural and humanistic va
affecting preservation activities. (Academic year)

279 **Research Seminar: American History** (3)
(*Formerly Hist 278*)
Admission by permission of instructor.

281–82 **Research Seminar: U.S. Diplomatic History** (3–3)
Prerequisite: Hist 181–82 or equivalent. (Academic year)

283–84 **Research Seminar: Recent U.S. History** (3–3) Ribu
Prerequisite: 6 semester hours of 100-level American History course
(Hist 283—fall)

285–86 **Research Seminar: Early National History, 1789-1828** (3–3)
Prerequisite: Hist 170, 175, or 181; or equivalent.

287 **Seminar: Problems in Latin American Civilization** (3)
Interdisciplinary seminar partially guided by a specialist within
methodology of a chosen discipline; each student writes a report
some aspect of a selected key theme. Admission by permission of
structor. (Spring) Thorn

288 **Research Seminar: History of Chinese Communism** (3)
Prerequisite: Hist 188 or equivalent. (Spring)

289 **Seminar: Modern Japanese History** (3)
Research and writing seminar on selected topics in modern Japanese
tory from the Meiji Restoration of 1868 to the present. (Spring)

* Offered jointly by the department of history and the American Studies Program.
† Joint offering of the departments of history and of urban and regional planning and the
Studies Program

291 **Research Seminar: 20th Century History** (3) — Sachar
Topic for 1976: era of World War I. (Fall)

292 **Research Seminar: the Palestine Question in Modern History** (3) — Sachar
(Not offered academic year 1976–77)

293–94 **Research Seminar: the Modern Near East** (3–3) — Davison
Prerequisite: Hist 193 or 194 or equivalent background. (Hist 294—spring)

295–96 **Research Seminar: the Modern Far East** (3–3) — Johnson
Prerequisite: Hist 195–96 or equivalent.

299–300 **Thesis Research** (3–3) — Staff
(Fall and spring)

FOURTH GROUP

Prerequisite to all fourth-group history courses: the appropriate second-group preparation and consent of instructor.

Fourth-group history courses are limited to graduate students; but they are primarily for doctoral students.

George Washington University is a member of the Folger Institute of Renaissance and 18th-century Studies. The policies of the Institute are set by a central committee on which each member institution is represented. Doctoral students enrolled in one of the Institute seminars are eligible to apply for fellowship aid. Folger Institute Seminars are numbered 301 through 309. Seminar titles for the 1976–77 academic years are listed below. Students wishing to register for these courses should consult the chairman of the department of history.

301 **English Renaissance Poetry: the Establishment of the Forms** (3) — Weismiller
(Fall)

302 **English Renaissance Palaeography** (3) — Staff
(Spring)

303 **Petrarch and Sonnet Sequences** (3) — Staff
(Fall)

304 **Literary Change in 18th Century British Literature** — Staff
(Spring)

305 **Folger Institute Seminar** (3) — Staff
Topic will be announced. (Fall)

306 **Folger Institute Seminar** (3) — Staff
Topic will be announced. (Spring)

307 **Folger Institute Seminar** (3) — Staff
Topic will be announced. (Fall)

308 Folger Institute Seminar (3)
Topic will be announced. (Spring)

311–12 Readings in Medieval History (3–3)
(Hist 312—spring)

321–22 Readings in Early Modern History (3–3)

341–42 Readings in Modern European History (3–3)
(Hist 342—spring)

345–46 Readings in Russian History (3–3)

351–52 Readings in English History (3–3)

361–62 Readings in Latin American History (3–3)

371–72 Readings in American Social History (3–3)

*373–74 **Readings on the Negro in American Culture** (3–3)
(Academic year 1975–76 and alternate years)

375–76 Readings in U.S. Political History (3–3)
(Hist 375—fall)

†379–80 **Readings in Economic History** (3–3)
Hist 379: American economic history. Hist 380: modern European economic history. (Academic year)

381–82 Readings in American Diplomatic History (3–3)
(Hist 382—fall)

385 Readings in History of Women in America (3)
(Spring)

386 Readings in Early American History (3)
(Fall)

387–88 Readings in the History of Sino-Soviet Relations (3–3)
(Hist 388—fall)

395–96 Readings in Modern Far Eastern History (3–3)

398 Advanced Reading and Research (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

* Offered jointly by the department of history and the American Studies Program
† An interdepartmental course offered by the departments of history and economics

Human Kinetics and Leisure Studies

Professors R.G. Hanken, L.M. Stallings, J.L. Breen (*Chairman*), D. Hawkins (*Research*)
Professorial Lecturers M.R. Hanson, E.L. Shafer
Associate Professors L.H. George, J.E. Snodgrass, M.R. Withers, S.L. Clark, A.L. Dickerson (*Research*)
Adjunct Associate Professors D.C. Paup, P.J. Verhoven
Associate Professorial Lecturers M. Millan, J.W. Eberhard, T. Songster
Assistant Professors H. Nashman, N.D. Johnson
Assistant Professorial Lecturers B.S. Katz, S.Y. Cha, W.A. Hillman, Jr., L. Houstoun, Jr., D. Duncan, D.M. Compton
Lecturers M.M.H. Ramsay, J. Sellars, M.H. Svehla, M.K. Elbin, L.A. Fusillo, L.K. Johnson, R.A. Lancaster, S.N. Smith, R.H. Zuber
Instructor D.C. Park (*Research*)

Programs of study leading to the degrees of *Bachelor of Science in Human Kinetics and Leisure Studies* (opportunity for specialization in elementary and secondary school physical education or dance), *Master of Arts in Education* (field in human kinetics and leisure studies with specialization in adaptive physical education, dance, movement studies of children, secondary school physical education, therapeutic recreation, tourism, or urban recreation and parks) are offered by the School of Education (see pages 107–37).

From 3 to 4 semester hours of first-group human kinetics and leisure studies courses are required for bachelor's degree candidates in the education and human kinetics and leisure studies curriculum in Columbian College of Arts and Sciences.

The University is not responsible for injuries received in intramural games or in any of the activities of the department of human kinetics and leisure studies, and the student assumes full responsibility therefor.

FIRST GROUP

Courses numbered from 1 to 49 are beginning activities courses and require a minimum of 24 clock hours of instruction.

Courses numbered from 50 to 100 are for students who wish in-depth training in a particular activity. They require a minimum of 48 clock hours of instruction.

A physical education activities fee of $4.50 a semester is required for registration in one or more of the activity courses (numbered 1 to 100).

Students whose medical examinations indicate the desirability for remedial or restricted activity are assigned to programs especially adapted to their needs.

Unless otherwise indicated, all first-group courses are offered both in the fall and spring semester.

All first-group courses may be repeated with permission of the instructor.

10 **Beginning Badminton** (1)	Breen
11 **Beginning Bowling** (1)	Staff
12 **Introduction to Ballet** (1)	Staff
13 **Beginning Ballet Technique** (1)	Staff
14 **Beginning/Intermediate Ballet Technique** (1)	Svehla
15 **Beginning/Advanced Ballet Technique** (1)	Svehla

16 **Introduction to Modern Dance** (1)

17 **Beginning Modern Dance Technique** (1)

18 **Beginning/Intermediate Modern Dance Technique** (1)

19 **Ethnic Dance** (1)

20 **Beginning/Intermediate Golf** (1)

21 **Foil Fencing** (1)

22 **Basketball** (1)

24 **Volleyball** (1)

26 **Karate (Korean Style)** (1)

27 **Beginning Tennis** (1)

28 **Karate (Korean Style)** (1)

29 **Yoga** (1)

30 **Body Conditioning** (1)
(Formerly Ski Conditioning)

31 **Backpacking** (1)

32 **Beginning Swimming** (1)

33 **Swimming/Life Saving** (1)

34 **Synchronized Swimming** (1)

35 **Slimnastics and Weight Training** (1)

37 **Soccer** (1)

38 **Paddle Ball** (1)

39 **Handball** (1)

40 **Squash** (1)

50 **League Bowling** (1 or 2)
Emphasis on competitive bowling as a lifetime sport.

51 **Gymnastics** (2)
Emphasis on apparatus and trampoline.

52 **Intermediate Modern Dance Technique** (2)

53 **Intermediate Modern Dance Technique** (3)
(Formerly Advanced Modern Dance Technique [2])
Admission by permission of instructor.

54 **Intermediate/Advanced Tennis** (2)
Development of skills, theories of strategy; emphasis on competitive
as a lifetime sport.

55 **Swimming—Water Safety Instruction** (2) — Staff

56 **Scuba Diving** (2) — Staff

57 **Intermediate/Advanced Badminton** (2) (Spring only) — Breen

58 **Intermediate Ballet Technique** (2) — Fusillo

SECOND GROUP

101 **Physical Education in the Elementary School** (3) — Snodgrass

For Elementary Education and Physical Education majors. Child growth and development related to school and playground programs in movement. Philosophy, curriculum, techniques of teaching, and equipment evaluation. (Fall)

102 **Movement Education** (3) — Snodgrass

Techniques of teaching movement education with emphasis on problem-solving methods for kindergarten and grades 1–6. Prerequisite: HKLS 101 or permission of instructor. (Spring)

103 **Professional Foundations and Concepts of Human Kinetics and Leisure Studies** (3) — Breen

Orientation to professional competencies; basic philosophy as it relates to the school, recreation associations, and professional associations.

105 **Introduction to Adaptive Physical Education and Therapeutic Recreation** (3) — Park

Philosophy, methods, and concepts relating to recreation and adaptive physical education for the ill, aged, and disabled. Concepts in program planning, leadership, and adaptations of activities to special groups. Includes field visitation and analysis of activities. (Fall)

106 **Introduction to Dance Therapy** (3) — Staff

General survey of dance therapy areas from theoretical and experimental points of view. Exploration of professional opportunities.

107 **Teaching Ethnic Dance** (2) — Johnson

(*Formerly three credits*)

Methods and materials for teaching the folk and social forms of dance. (Spring)

108 **Dance Improvisation** (2) — Withers

(*Formerly three credits*)

Awareness of body movements, environment, group dynamics, performance, and composition through improvisational technique. (Fall and spring)

109–10 **Dance Composition** (3–3) — Withers

HKLS 109: basic elements and principles of composition. HKLS 110: advanced problems in composition. (Academic year)

111–12 **Sports Education Technique** (3–3) — Staff

Techniques for teaching individual, dual, and team sports. (Academic year)

113–14 **Field Experience: Practicum in Physical Education, Dance, or Recreation** (3–3) Staff

Pre-practice teaching or leadership in elementary or secondary school physical education; adaptive physical education, dance, or recreation settings. Seminars relating to field experiences. (Academic year)

116 **Mime Movement and Theater** (1) Ramsay

Psychological improvisation, improvisation with masks, Commedia dell'Arte, Pantomime Blanche, chorus work, clown work. May be repeated for credit. (Spring)

117 **Dance Education** (3) Johnson

Organizational, methodological, philosophical, and conceptual approaches to the teaching of dance in academic and nonacademic settings. Prerequisite: HKLS 157. (Fall)

118 **Special Problems in Dance Composition** (1) Staff

Work with elements of movement leading to short composition studies.

119 **Creative Dance for Children** (3) Withers

Dance as an expressive art medium for children; emphasis on concepts and principles, methods and materials. Emphasis given to dance in elementary education with consideration for special education. (Spring)

120 **Repertory** (1 or 2) Staff

Study and performance of dance works. Admission by permission of instructor. May be repeated for credit. (Fall and spring)

121 **Dance Technique I** (1 to 3) Staff

Intermediate/advanced modern dance. Admission by permission of instructor. May be repeated for credit. (Fall and spring)

122 **Methods and Materials for Health Education** (3) Stalling

Conceptual approach to curriculum design and teaching, including planning and organization, methodology, selection and use of materials, and evaluation; basic health knowledge. (Fall and spring)

123 **Dance Technique II** (2 or 3) Withers

(*Formerly one or two credits*)

Advanced modern dance. Admission by permission of instructor. May be repeated for credit. (Fall and spring)

124 **Movement Technique for Theater** (1) Ramsay

Analysis of movement, dramatic justification of movement; mime technique; respiration and its integration with movement. (Fall)

129 **Introduction to Motor Learning** (3) Staff

Concepts of motor skill learning applied to the teaching of movement skills. (Spring)

130 **Motor Performance in Childhood** (3) Snodgrass

Study of the evolvement and refinement of fundamental movement skills. (Spring)

133 **Student Teaching** (6 to 12) Johnson

Prerequisite: HKLS 113–14 or equivalent. Admission by permission of instructor. (Fall and spring)

135–36 **Dance History** (3–3) Johnson

Study of dance from antiquity to present; emphasis on cultural significance of dance as art form, symbolic form, and social behavior. (Academic year)

137 **Dance Notation and Movement Analyses: The Laban System** (3) Katz

Concepts and applied principles of Laban's theories of movement (or Laban analyses) with emphasis on Labanotation. (Spring)

138 **Physical Education Curriculum and Administration** (3) George

Curriculum and administration in physical education. Professional ethics. (Fall)

139 **Teacher Behavior** (2 or 3) Breen

Teacher behavior analyzed in relation to motives, attitudes, and expectations. Integration of structure, psychological processes, and behavior emphasized for a more thorough understanding of the adjustment processes. (Spring)

141–42 **Theater Production for the Dance** (2–2) Johnson

Theories and practicum in technical aspects of dance production. HKLS 141: lighting, sound and theater management. HKLS 142: costuming, make-up, sets, props, and audio-visual techniques. (Academic year)

144 **Choreography** (2) Withers

Solo and group. May be repeated for credit. (Fall and spring)

150 **Human Anatomy** (3) Stallings

Systematic study of the structure of the human body; emphasis on kinesiological anatomy, including joints, muscles, and neuromuscular integration. (Fall)

151 **Kinesiology** (3) Paup

Analysis of human movement, including mechanical physics, anatomy, and physiology. Prerequisite: approved course in anatomy. (Spring)

152 **Environment, Leisure, and Quality of Life** (3) Staff

Environmental problem-solving through ecological and social planning; concentration on the impact of leisure on total human physical and cultural development; emphasis on philosophical considerations. (Fall)

156 **Application of Recreational Skills to Urban Living** (3) George

Development of recreational skills; emphasis on local opportunities for recreational activities. Current trends in urban recreational development and program planning. May be repeated for credit with permission of instructor. (Fall and spring)

157 **Dance Technique Theory** (3) Sellars

Theoretical foundations of dance. Applied principles of kineseology, analysis and practice of contemporary dance techniques. (Fall)

158 **Safety Education** (3) Milla
Liability, prevention, and emergency care of all types of injuries wit
reference to first aid and athletics. Proper use of personnel, facilities, an
equipment. (Fall)

164 **Physiology of Exercise** (3) Paul
The physiological functions of the body and the effect of exercise on these
functions. Prerequisite: HKLS 150 or permission of instructor. (Fall

170 **Problems Seminar** (3) Georg
Content differs each time course is offered, according to current issues
professional policies, and practices. May be repeated for credit.
(Spring)

171 **Current Professional Literature** (2 or 3) Snodgrass
Study of current education literature with implications for physical edu
cation and the utilization of retrieval systems. (Fall)

172 **International Experiences** (1 to 6) Staff
Special travel to foreign countries to study programs with implications
for professional development.

173 **Independent Study** (1 to 6) Staff
Individually designed model for intensive study in an area of special in
terest. Prerequisite: demonstrated competency for independent work and
permission of adviser and instructor. (Fall and spring)

175 **Seminar in Music and Dance** (3) Staff
(*Formerly Dance Accompaniment*)
Rhythmic analyses; resources in music and accompaniment principles for
dance. Prerequisite: basic knowledge of rhythmic theory. (Spring,
even years)

184 **Workshop in Human Kinetics and Leisure Studies** (1 to 3) Staff
Workshops in human kinetics and leisure studies, dance, and recrea
tion. Current problems, practices, and new approaches. Content of each
workshop will depend on current needs. May be repeated for credit with
permission of adviser.

THIRD GROUP

201 **Philosophic Foundations of Physical Education** (3) Brow
Concepts of philosophy and research method applied to objectives and
practices in physical education. (Spring)

202 **Conceptual Basis of Motor Learning** (3) Staff
Variables of perceptual motor learning and performance; theories, con
cepts, and models of learning related to the development of motor skill.
(Fall and spring)

205 **Diagnostic-Prescriptive Techniques: Perceptual-Motor Domain** (3) Staff
Programs of perceptual-motor development and their theoretical assump
tions; diagnostic and remediation techniques. (Spring)

211 **Problems and Modern Trends in Physical Education** (3) Breen

Lecture (2 hours), conference (1 hour). For experienced teachers. Organization, supervision, and curriculum problems growing out of current issues; program planning policies; competition.

220 **Problems in Health Education** (3) Staff

Lecture (2 hours), conference (1 hour). Health needs, policies and program planning, use of community resources, promising practices in the field. (Fall)

230 **Movement Analysis** (3) Breen

Scientific analysis of fundamental movement and sports skills. (Fall 1976 and alternate falls)

232 **Current Issues in Elementary School Physical Education** (3) Snodgrass

Current philosophy, trends, and research; implications for curriculum, instruction, evaluation. (Spring)

234 **Organization and Administration of Elementary School Physical Education** (3) Snodgrass

For school administrators, supervisors, principals, and physical education specialists. Curriculum, administrative, and supervisory problems; kindergarten, grades 1–6. (Spring)

239 **Urban Recreation for Special Populations** (3) Staff

Development of recreation for the disabled, impaired, and handicapped using the Baltimore-Washington areas as the urban problem setting; development of competencies in community organization, communications, consultation, group dynamics, and interpersonal relations; program development and evaluation. (Fall)

240 **Physical Education for the Handicapped** (3) Breen and Staff

Adaptive physical education for handicapped populations; development of competencies in diagnostic/prescriptive teaching, program design and evaluation, consultation, and communications. (Fall)

244 **Therapeutic Recreation Practice** (3) Staff

Professional competencies for delivery of services to the handicapped, disabled, impaired; public and private setting for service delivery; client assessment and counseling techniques; basic special education, medical, and rehabilitation terminology; etiology of handicapping conditions as related to recreation. (Spring)

245 **Medical Aspects of Therapeutic Recreation and Adaptive Physical Education** (3) Hawkins

Etiology, symptomology, and treatment of chronic and traumatic disorders associated with handicapping conditions; implications for programming, facility development, and related aspects of therapeutic recreation or adaptive physical education. (Spring)

250 **Administration of Leisure and Tourism Services** (3) Verhoven

Planning and organization of a comprehensive system of urban leisure services utilizing educational, cultural, and recreational resources; em-

phasis on public relations, personnel administration and supervision systems analysis, fiscal management and managerial accountability. (Spring) Staff

251 **Leisure Counseling** (3)
The application of counseling techniques to leisure service in order to provide recreators the ability to help people make choices of leisure experiences. (Spring) Staff

252 **Supervision of Leisure Studies** (3)
Solving problems in supervision of leisure programs, including work distribution, scheduling, recruitment, training and personnel evaluation. (Fall) Staff

256 **Sports Medicine and Rehabilitation** (3)
Theory and practice of therapeutic exercise and recreation as applied to the rehabilitation of the handicapped; injuries; preventive, adapted, and remedial concepts; research in area of general rehabilitation practice; professional roles as related to ancillary medical focus. (Spring) Hawkins

260 **Tourism Development** (3)
Socioeconomic analysis of demand for travel and tourism resources; techniques for planning and design; examination of current trends. (Fall) Breen

265 **Sports and Politics** (3)
(Formerly Sports Policy and Political Systems)
Methods of political analysis applied to sports policy; comparative approach to the study of the relationships between ideology, economic development, and the types and levels of government invqlvement in sports policy. (Spring) Staff

270 **Philosophic Foundations of Dance** (3)
Examination and discussion of problems in dance confronting the artist as well as the audience, in terms of dance as an art form and the creating and experiencing of that form. Ka

271 **Dance Notation and Reconstruction** (3)
Recreating the structure and dynamics of movement from Labonotation dance scores; exploration of floor work; some emphases in writing skills leading to elementary or intermediate certification. Prerequisite: HKLS 137. (Fall) Ka

272 **Advanced Notation** (3)
Advanced methods of observing, recording, and analyzing movement. Prerequisite: HKLS 271. (Spring) St

273 **Advanced Choreography** (3)
Advanced choreographing of group or solo dance work. Course work includes responsibility for auditions, rehearsals, and final work presented in concert. May be repeated once for credit. (Fall or spring) St

276 **Dance in Society** (3)
Anthropological aspects of dance; emphasis on current research and literature.

277 **Dance Expressions in Selected Cultures** (3 or 6) Staff

Investigation of traditional dance forms through research and field work. Research usually conducted in the field. (Fall and spring)

280 **Advanced Workshop** (1 to 3) Staff

Workshops in Physical Education, Dance, and Recreation. Emphasis on contemporary issues and problems; development of advanced professional competencies. May be repeated for credit with permission of adviser.

283 **Supervised Experience** (3 to 6) Staff

Field work, internship and/or instructional practice, including conference and/or seminar. May be repeated once for credit with permission of adviser. (Fall and spring)

296 **A Systems Approach to Leisure and Tourism Resource Development** (3) Shafer

Comprehensive planning, human resource development, and program facility design, using systems approaches. (Spring)

297 **Advanced Topical Studies** (3 to 6) Staff

Independent research and study pertinent to the needs of the student. Prerequisite: Educ 295 or permission of instructor. May be repeated once for credit with permission of the adviser. (Fall and spring)

Institute for Sino-Soviet Studies

MEMBERS OF THE INSTITUTE

G. Sigur (*Director*), C.F. Elliott, S.A. Grant, A. Gyorgy, H.C. Hinton, W.R. Johnson, Y. Kim, C.A. Linden, F.H. Michael, G.A. Olkhovsky, V. Petrov, C. Shih, R.B. Thompson, R. Thornton, R.Y. Yin

ASSOCIATE MEMBERS OF THE INSTITUTE

J. Baclawski, E.M. Hadley, A. Halpern, J. Hardt, T. Hsia, B. Ramundo, P. True, R.K. White, T.W. Wolfe

The Institute for Sino-Soviet Studies offers specialized graduate study in the School of Public and International Affairs. Students who lack background in Soviet and East Asian studies are required to take undergraduate courses selected by the adviser as prerequisite to graduate work. Related preparatory undergraduate courses include the following: Econ 101, 102, 133, 134, 169, 170; Hist 137, 138, 143, 144, 145, 146, 187, 188, 189, 195–96; PSc 5, 101, 112, 115, 160, 162, 163, 193, 194; Psyc 151.

For description of the objectives and programs of the Institute, see pages 189–90. For descriptions of the courses listed below, see the appropriate departmental listing.

ECONOMICS

267 *Seminar: Soviet Economy* (3) Hardt

268 *Seminar: Economic Theory and Development in Communist Countries* (3) Hardt
269 *Economy of Communist China I* (3) Yin
270 *Economy of Communist China II* (3) Yin
271 *Economy of Japan* (3) Hadley

GEOGRAPHY AND REGIONAL SCIENCE

265 *Seminar: Geography of the Soviet Union* (3) Baclawski
266 *Seminar: Geography of China* (3) Trewartha

HISTORY

205 *Evolution of Nationalism in Eastern Europe* (3) Petrovich
206 *Revolution in Eastern Europe* (3) Petrovich
207 *Seminar: the Communist Party of the Soviet Union* (3) Grant
208 *Research Seminar: History of World Communism* (3) Thornton
*213 *Comparative Communist Systems I* (3) Petrovich
*214 *Comparative Communist Systems II* (3) Hinton
215 *Transformation of the Socialist Commonwealth* (3) Petrovich
217–18 *Seminar: Russian and Soviet Thought* (3–3) Grant
*231 *Seminar: Sino-Soviet Relations* (3) Michael
237 *Seminar: Soviet Foreign Policy, 1917-1960* (3) Petrovich
245 *Studies in Revolutionary History* (3) Thompson
246 *Research Seminar: Russian History* (3) Thompson
288 *Research Seminar: History of Chinese Communism* (3) Thornton
289 *Seminar: Modern Japanese History* (3) Sigur
295–96 *Research Seminar: the Modern Far East* (3–3) Johnson
345–46 *Readings in Russian History* (3–3) Thompson
387–88 *Readings in the History of Sino-Soviet Relations* (3–3) Thornton
395–96 *Readings in Modern Far Eastern History* (3–3) Johnson

†LAW

546 *Soviet Law* (2) Ramundo
547 *Chinese Law* (2) Hsu

POLITICAL SCIENCE

*213 *Comparative Communist Systems I* (3) Petrovich
*214 *Comparative Communist Systems II* (3) Hinton
215–16 *Seminar: the Communist Camp in World Politics* (3–3) Shulman
224 *Readings in Socialism and Communism* (3) Elliott, Lindsay
227 *Seminar: Governments and Politics of Eastern Europe* (3) Gwertzman
229 *Readings in Soviet Government and Politics* (3) Elliott, Lindsay
*231 *Seminar: Sino-Soviet Relations* (3) Michael
232 *Seminar: International Communications* (3) Starr
233 *Seminar: Soviet Government and Politics* (3) Elliott, Lindsay

* An interdepartmental course offered by the departments of history and political science
† Students who elect courses in law must have the permission of the Dean of the National Law Center. For course descriptions, see the *National Law Center Catalogue*.

253 *Seminar: Chinese Government and Politics* (3) Michael
254 *Colloquium: East Asia* (3) Michael
255 *Colloquium: Russia and Eastern Europe* (3) Gyorgy
257–58 *Seminar: Communism in Developing Countries* (3–3) Staff
265–66 *Chinese Communist Policy Processes* (3–3) Hinton
269 *Seminar: Soviet Foreign Policy* (3) Elliott
270 *Political and Social Institutions of Eastern Europe* (3) Gyorgy
274 *Principles and Problems of International Political Communication* (3) Staff
288 *Seminar: Soviet Military Policy and Strategy* (3) Wolfe
294 *Seminar: Governments and Politics of Japan and Korea* (3) Staff
295 *Seminar: Chinese Communist Foreign Policy* (3) Hinton
296 *International Politics of the Far East* (3) Hinton
298 *Southeast Asia in World Politics* (3) Staff
325 *Research Seminar: Topics in Marxism-Leninism* (3) Elliott, Linden

YCHOLOGY

259 *Seminar: Psychology of Communism* (3) White

ernational Affairs

"Public and International Affairs."

ernational Relations—Doctoral Study

TORAL PROGRAM COMMITTEE IN INTERNATIONAL RELATIONS

Sapin (*Chairman*), R.M. Dunn, Jr., A. Gyorgy, W.R. Johnson, B. Nimer, eich, H.M. Sachar

e Graduate School of Arts and Sciences offers an interdisciplinary program g to the degree of Doctor of Philosophy in the field of International Relations. School of Public and International Affairs offers a Master of Arts degree pro- in the area of international affairs.) The program is directed by a committee e members are drawn from the departments of economics, political science istory

ated: the general requirements, pages 95–97, 102–104. Each program must le three disciplines and five fields of study. However, in some cases, cohesive ell integrated programs based on two disciplines may be approved. Specific ni guidelines are available from the Graduate School on request.

an

Romance Languages and Literatures."

Japanese

See "East Asian Languages and Literatures."

Journalism

Professorial Lecturers F.L. Dennis, H.L. Coppenbarger, H.E. Paine
Associate Professors R.C. Willson, P. Robbins (*Chairman*)
Associate Professorial Lecturers C.W. Puffenbarger, O.L. Mazzatenta, P. Silbe-
man, D.W. Burkett, R.L. Courage, G. Cheely, J.P. McGill, C.W. Crawfor
E. Rogers
Assistant Professorial Lecturers J.C. Dawson, T.W. Zito, Jr., J. Coldsmith, N.
Gregg

Bachelor of Arts with a major in Journalism (Departmental).—The following re
quirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students planning to major in journalism should take Engl 12 rather than Engl 11 in satisfying the English composition requirement.)
2. Prerequisite courses—Engl 51–52 or 71–72; Jour 71–72; PSc 4 and 6 or and 6.
3. Required courses in the major—24 hours of second-group courses in Journalism, including (a) Jour 111, 196, 198; and (b) 9 semester hours chosen from Jour 121, 125, 133, 135, 137, 138, 139, 151, 155.
4. Required as a minor area of concentration—a minimum of 18 semester hours of second-group courses, chosen in consultation with the major adviser, in one other department or field of study in Columbian College of Arts and Sciences.

Recommended Electives: Econ 121, 142, 161, 162, 181–82; PSc 103, 104, 122, 125, 126, 145, 146; Psyc 115; SPDR 133, 134, 135–36; Stat 53.

Departmental prerequisite: Jour 111 is prerequisite to Jour 125, 133, 135, 138, 139, 190 and 196.

FIRST GROUP

Wils

71–72 Introduction to Mass Communication (3–3)

Jour 71: evolution of newspapers and other media in relation to po
cal, social, and economic life; concept of press freedom. Jour 72: m
media, problems of contemporary journalism, emphasis on federal gove
ment-media relations. (Academic year)

SECOND GROUP

Robb

111 Reporting (3)

Gathering, evaluating, and writing news. Some typing required. Laborat
fee. $5. (Fall and spring)

Coppenbarg

115 Newspaper Editing and Make-up (3)

Preparation of news copy, pictures, and other graphic material for pu
cation; evaluation of news; page layouts; newspaper make-up. (Fal

116 **Magazine Layout and Design** (3) Paine

Layout, typography, and design for magazines, newsletters, house organs, and similar publications for associations, institutions, and industry. (Fall)

117 **Magazine Editing** (3)

The editor's responsibility to publisher and readers. Setting the editorial goals and planning content and production to meet them. Editing copy for general and specialized magazines.

121 **Feature Writing** (3) Willson

Free-lancing nonfiction articles, materials obtained through independent investigation. (Fall and spring)

125 **Science Writing** (3) Burkett

Writing science news for the mass media. (Spring)

133 **Advanced Reporting: Community News** (3) Puffenbarger

Coverage and writing of local news. (Fall)

135 **Advanced Reporting: Consumer Affairs** (3) Dawson

Specialized training in the consumer news field. (Fall)

137 **Advanced Reporting: National Affairs** (3) Silberman

Coverage and writing of federal government news. (Fall)

138 **Investigative Reporting** (3) Crawford

In-depth reporting in selected areas of political, economic, and social affairs. (Spring)

139 **Advanced Reporting: Radio and Television News** (3) Cheely

Preparing news and public affairs programs for broadcast media. (Spring)

140 **Photojournalism** (3) Mazzatenta, Gregg

Taking and processing photographs for publication, picture selection and cropping, captions. Students must purchase their own film and print paper. Laboratory fee, $25. Students who received credit for Art 23 or 24 cannot receive credit for Jour 140. (Fall and spring)

141 **Advanced Photojournalism** (3) Rogers

Advanced news and feature photography, editing, layout and photo essays. Students must purchase their own film and print paper. Laboratory fee, $25. Prerequisite: Jour 140 or Art 23–24. (Spring)

142 **Special Projects in Photojournalism** (3) Rogers

Individual projects in picture stories and photo essays in black and white or color; emphasis on layout, captions, text. Students must purchase own film and print paper. Laboratory fee, $25. Admission by permission of Instructor.

145 **Principles and Problems of Public Relations** (3) McGill

Principles, problems, and ethics of public relations for government agencies, commercial establishments, educational and other public institutions. Case histories of successful programs. (Fall and spring)

146 **Government Information** (3) Courag

Growth of information activities in government and the role of the i formation specialist. Writing and editing for government information o erations. (Spring)

150 **News Coverage in Washington** (3) Willso

The Washington news beats, channels and sources of news in the natio capital, uses and abuses of the media. Field trips to local news cente and press briefings. Guest lecturers from the Washington press corps.

151 **Editorial Writing** (3) Robbu

Techniques of editorial writing, conducting the editorial page, functio editorials and columns of news commentary in a free press. (Spri

155 **Critical Writing and Reviewing** (3) Zi

Reviewing and commenting on the arts and entertainment for the ma media. (Fall)

160 **The New Journalism** (3) Robb

A survey of the impact of fiction techniques on modern nonfiction portage. Study of selected writers to identify influences and trends.

170 **News Publication Management** (3) Coldsm

The business side of publishing. Study of the roles of advertising, cir lation, promotion, accounting and administration, and mechanical dep ments in newspapers and other publications. (Spring)

190 **Internship in Journalism** (3)

Study of a journalistic medium in action by assignment to a Washing area news office. Admission restricted to senior Journalism ma selected by a departmental committee. (Fall and spring)

195 **Documentary Photography** (3) Lake and S

Social problems, team-taught. Each student will work on projects p social dimensions. Laboratory fee, $25. Admission by permission of structor. Limited enrollment. (Spring)

196 **Senior Project** (3)

Open only to journalism majors. Major journalistic effort undertaken consultation with a member of the Journalism staff. A written repo describing the project must be presented to the staff member for appro and filed with the student's adviser in the semester before registra (Fall and spring)

198 **Law of the Press** (3) De

Freedom of the press, censorship, legislative controls, publications b tempt of court, copyright, newsgathering agencies, labor laws affe newspaper business, law of libel, privileged matter, fair comment on lic characters, right of privacy. (Fall)

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* Interdepartmental course offered by the departments of journalism and art

Judaic Studies

COMMITTEE ON JUDAIC STUDIES

D.A. Altshuler (*Chairman*), R.H. Davison, R.E. Jones, T.Z. Lavine, B. Nimer, B. Reich, H.M. Sachar, J.E. Ziolkowski

Columbian College of Arts and Sciences offers an interdisciplinary program Judaic Studies leading to the degree of Bachelor of Arts. This program is tended for students who wish to investigate the history, language, literature, ligious and philosophical thought, and political and social experience of the wish people from the perspective of several academic disciplines. (Students no wish to concentrate on the religious aspects of Judaism and its relationship the other religious traditions of the world may prefer to elect a major in ligion with an emphasis on Judaism [see page 454].)

Bachelor of Arts with a major in Judaic Studies (Interdepartmental).—The follow- requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—Clas 21–22, 23–24.
3. Required courses for the major (30 semester hours):
   (a) Clas 103 or 104; Hist 158; PSc 180; Rel 113–14 or 115–16, 213 or 238.
   (b) two meaningfully related courses selected from each of two of the following groups: I—Anth 177, 183; Art 111, 112; II—Hist 108, 109, 110, 113, 114, 121, 122, 123, 124, 139, 140, 171, 172, 193, 194, 292, 293, 294; III—Phil 111, 112, 126, 127, 131, 172; IV—PSc 179, 191; V—Rel 103, 104, 105, 107, 111, 122, 126, 137, 143, 144, 145, 146, 161, 162, 172, 174, 181, 184, 291, 292.

Students applying for the 90-hour degree program in Judaic Studies must, in addition to meeting the general requirements (see pages 87–88), present evidence of exceptional preparation in the field of Judaism, provide strong recommendations from high school teachers and or counselors, and complete a satisfactory interview with the Committee on Judaic Studies.

Latin American Studies

COMMITTEE ON LATIN AMERICAN STUDIES

M. Gordon (*Chairman*), F. Belaunde-Terry, T.F. Carroll, J. Grunwald, R.L. Humphrey, Jr., P.F. Klarén, J.W. Robb, F.R. Siegel, G. Stuart, C. McClintock, F. Thoumi

Bachelor of Arts with a major in Latin American Studies (Interdepartmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—Anth 2, Econ 1–2, PSc 4 or 5.
3. Required courses in related areas—Span 1–2, 3–4; or equivalent. (Span 9–10 or equivalent is recommended.)
4. Required courses in the major—(a) Anth 172, 184, or 185; Econ 185; Geog 161; Hist 163–64; PSc 177, 178; and 6 semester hours chosen from Span 151–52, 155–56, 157–58, or other approved courses. (b) 18 semester hours, including an interdisciplinary seminar (287) in one of the following areas: anthropology, economics,

geography and regional science, Hispanic literatures, history or political science. The required courses listed in (a) which are in the selected area may be included in computing the required 18 semester hours for (b).

Master of Arts in the field of Latin American Studies.—See the School of Public and International Affairs, pages 173–75, 182–86, 187.

Candidates for the degree of Doctor of Philosophy may elect Latin American history as an area of specialization in the field of history, Spanish American literature as an area of specialization in the field of Romance Languages and Literatures, or politics of Latin America as an area of specialization in the field of political science.

COURSES DEALING WITH LATIN AMERICA

Anthropology—170, 172, 184, 185, 262, 268, 282, 287
Economics—185, 233, 234, 251–52, 285, 286, 287
Geography and Regional Science—127, 161, 261, 287
History—161, 163–64, 165, 166, 261–62, 287, 361–62
Political Science—177, 178, 277–78, 287
Portuguese—31–32
Spanish—91–92, 151–52, 155–56, 157–58, 197–98, 253, 255, 256, 261, 266, 287

Latin

See "Classics."

Management Science

Professors R.F. Ericson, G.L. Lippitt, M.M. Wofsey, P.B. Vaill, J. Harvey
Professorial Lecturers C.W. Clewlow, M.H. Schwartz, C. Laidlaw, T. O'Co
G.B.M. Hopper, R. H. Walther
Associate Professors J.F. McCarthy, Jr. (*Chairman*), T.E. Shaughnessy
Holland, E.K. Winslow, W.E. Smith, W.W. Hardgrave, E.B. Adams
Coyne
Adjunct Associate Professor H.C. Demoody
Associate Professorial Lecturer C.E. Fisk
Assistant Professors J. Lobuts, Jr., E.H. Forman, B. Dawson, S. Umpleby
Assistant Professorial Lecturer C.D. Villa

Programs of study leading to the degrees of *Bachelor of Business Administration*, *Master of Business Administration*, *Doctor of Business Administration*, and *Master of Public Administration* are offered by the School of Government and Business Administration (see pages 138–72).

SECOND GROUP

Smith

118 **Introduction to Information Processing** (3)

Basic principles, terminology, and methods of computer data proces

Introduction to the use of the computer as a tool through homework assignments illustrating typical problems encountered in business and government data processing. Assignments involve flow charting and computer programming in a higher level language (FORTRAN) and are run on the SCBA computer with the School's computer terminals. Laboratory fee, $25. (Fall and spring)

119 **Computer Programming for Information Systems** (3) Smith

COBOL programming for business and government data processing applications. For students already familiar with basic computer concepts, flow charting, and programming. Emphasis on practical computer applications in accounting and management information systems. Prerequisite: Mgt 118 or Stat 97. Laboratory fee, $25. (Fall and spring)

120 **Information Systems Development I** (3) Coyne, Smith, Demoody

Assessment of the systems concept and its relationship to organizational information decision-making and management. Concepts and techniques involved in the initial development of new or revised computer-based information systems, e.g., systems analysis and design phases. Prerequisite: Mgt 118, 119, or permission of instructor. Laboratory fee, $25. (Fall)

121 **Information Systems Development II** (3) Coyne, Smith, Demoody

A further examination of the information systems development process, including concepts and techniques for assessment, selection, introduction, operation, and maintenance of a newly designed automated information system. Prerequisite: Mgt 120 or permission of instructor. Laboratory fee, $25. (Spring)

122 **Special Studies in Information Systems** (3) Coyne, Smith, Demoody

An independent or group-study project in information systems development which may involve faculty-supervised research, a case-study project, or field experience as an intern systems analyst in a local public or private organization. Prerequisite: Mgt 121 or permission of instructor. (Fall and spring)

RD GROUP

201 **Advanced Administrative Management** (3) Adams, Ericson, Eastin, Brown, Roman, Loeser

Integrative approach to organization and management concepts, philosophy and theory as applied to all types of agencies and institutions. Evolution of management thought, functions and practices in various organizational contexts. Contemporary issues confronting the manager. (Fall and spring)

203 **Mathematics for Management** (3) Hardgrave, O'Connor

Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus, and linear algebra to optimization problems. Prerequisite: knowledge of algebra. (Fall and spring)

204 **Quantitative Factors in Administration** (3) Hardgrave, Dawson, Forman

Survey of quantitative techniques in solution of management problems. Potentials and limitations of mathematical models and proper areas for

their application. Breakeven analysis, linear programming, probabi
decision-making under uncertainty, queuing models, inventory mo
(Fall and spring)

207 **Human Behavior in Organizations** (3) Lippitt, Winslow, Harvey,

Individual, group, intergroup, and other human behavior and dev
ment; application of behavioral science research to administration. L
ing exercises and practical applications emphasized. Prerequisite:
201. (Fall and spring)

208 **Current Issues in Organizational Behavior** (3) Wi

Study of behavioral factors relating to issues such as automation, e
interpersonal relations, organizational change, and similar problems.
lems in behavioral science research. Prerequisite: Mgt 207. (Fal
spring)

210 **Behavioral Factors in the Process of Change** (3) Harvey, Wi

Review of research, theory, and practice related to the process of ch
Basic principles of planned change: individual, group, organization,
munity, and cultural change. Emphasis on the relationship betwee
man behavior research and theory and the change process. Prereq
Mgt 207 or permission of instructor. (Fall and spring)

212 **Organizational Development: Concepts and Methods** (3) Lippitt, Harvey,

Primarily for doctoral students. Examination of different concep
organizational structure, processes, and growth. Models of organiza
change will be developed with a taxonomy of methods of initiating
to further organizational development. The methods of action, res
team building confrontation methods, objectives analysis, surve
search, and structural revision will be related to organizational de
ment processes. Prerequisite: Mgt 207, 210; or equivalent. (Fall)

213 **Consultative Processes in Organizations** (3) Lippitt, H

Primarily for doctoral students. Examination through actual prac
well as theory of the nature of the helping process between one
or group and another person or group. Dynamics of the con
process will be explored as well as role differences in internal a
ternal consultation. Development of skill in the helping relationsh
be furthered within the framework of interpersonal relation concep
laboratory experiences. Prerequisite: Mgt 207, 210; or equivalent.
(Spring)

225 **Managerial Statistics I** (3) Hardgrave, Dawson, F

Mathematics of probability and statistics and application to mana
science and operations research. Topics include sample spaces, pro
models and random variables, discrete and continuous probabilit
butions, moments and other descriptive measures, sampling
and practice, and point and interval estimation. Prerequisite: M
or equivalent. (Fall and spring)

226 **Managerial Statistics II** (3) Hardgrave, Dawson, F

Applications of the theory and techniques of mathematical s
Topics include hypothesis testing, nonparametric methods, anal

variance, introduction to statistical decision theory. Prerequisite: Mgt 225. Laboratory fee, $10. (Fall and spring)

227 **Mathematical Programming: Techniques and Applications** (3) Hardgrave, Dawson, Forman

Technical and applied considerations of linear programming and related methods. Mathematical and computational aspects of linear programming. Formulation of linear programming models. Studies of applications of linear programming. Introduction to integer programming, algorithms and formulations. Prerequisite: Mgt 203 or equivalent. Laboratory fee, $10. (Fall)

228 **Techniques of Operations Research** (3) Hardgrave, Dawson, Forman

Survey and introduction to contemporary operations research techniques, including nonlinear programming, dynamic programming, inventory and queuing models and simulation. Applications of such methods as models of common processes. Prerequisite: Mgt 225, 227. (Spring)

229 **Seminar: Management Sciences and Operations Research** (3) Hardgrave

Supervised in depth study and advanced projects in applied operations research. Prerequisite: Mgt 228 or permission of instructor. (Spring)

240 **Survey of Information Technology** (3) Adams, McCarthy, Demoody

Management oriented survey of key areas in information technology. Includes hardware configurations, processing procedures and new developments; software languages, capabilities, procedures and interactive programming; systems technology, analysis and design, systems concepts, modeling and simulation impact on the organization; EDP management areas, equipment upgrading; replacement and acquisition; personnel practices; budgeting and costing procedures, security of the facility; legislative and social issues, Freedom of Information Act, Family Educational Rights and Privacy Act of 1974, employment patterns, professionalization, shifts in power and value systems. Laboratory fee, $25. (Fall and spring)

241 **Management Information Systems Development and Application** (3) McCarthy

Contemporary theories and practices in the development of management information systems. Participation in the design of information systems specifications. The roles of both management and systems design personnel in the systems development process studied and evaluated. Impact of management information systems upon the organization and its decision-making processes evaluated. Case studies. Prerequisite: an introductory course in information technology, or permission of instructor. (Fall)

242 **Comparative Computer Systems** (3) Wofsey, Coyne

Characteristics and capacities of the range of information processing equipment in use today. Recent and prospective equipment and software development. Selection of computers and related software and equipment. Prerequisite: Mgt 241 or permission of instructor. (Spring)

243 **Management of Information Technology** (3) Adams

Advanced course; emphasis on principles, practices, and trends in the management of information technology. Topics include the role and

control of an information processing installation; trends, new hardware and advanced technology in the computing milieu and their implications for information processing management; an analysis of the performance of the data processing activity internally and externally, according to developed criteria. Case studies. Prerequisite: Mgt 241, 242; or permission of instructor. (Fall)

244 **Information Systems and Telecommunication** (3) Coyne, Schw

Study of the growing linkages among the technology of informa processing, information transmission, and organization management computers, communications, and managers—from two points of view (1) new potentials for improved management, and (2) solving commun cations-related problems of informations systems design, implementa and operation. Admission by permission of instructor. (Fall)

245 **Data Base Management** (3) Smith, C

An in-depth approach to the understanding and use of the latest tech niques for developing and implementing an effective data base system Topics include data base organization, creation, and maintenance; effe and economic justification; evaluation criteria; standardization of data ba systems; impact of packaged data management systems; and an analysis the current state-of-the-art in data base development. Students w come proficient in the use of an actual data base management sys Prerequisite: Mgt 119, 241. Laboratory fee, $25. (Spring)

249 **Seminar: Information Technology** (3) Wofsey, McCar

Current problems in the design and implementation of computer-suppor systems; emphasis on current state-of-the-art through discussion leading experts in the field, analysis of literature. Prerequisite: Mgt 2 242, 243; or permission of instructor. (Fall and spring)

260 **Introduction to General Systems and Cybernetics** (3) Ericson, Adams, Ump

Analysis of fundamental general systems concepts and cybernetic the evolving in various branches of knowledge and academic disciplin emphasizing their transcontextual and interdisciplinary nature. Sys approach and general systems frame of reference compared and c trasted. Essential characteristics of and requirements for creation maintenance of viable systems.

261 **Fundamentals of General Management System and Organizational Cybernetics (GEMSOC)** (3) Ericson, Adams, Ump

Dynamics of organization and management from a general system cybernetics viewpoint. GEMSOC potential for integrating appr disparate aspects of organization and management research and Translation of GEMSOC research and theory into the world of orga tional behavior and management practice. Prerequisite: Mgt 260

263 **Case Studies and Field Research in GEMSOC** (3) Ericson, Ad Ump

Investigations of existing organizational structures and ongoing ment processes from a systems and cybernetics viewpoint. Ope evaluations of firms and agencies, including intercontextual com studies. Assessments of need for better tools of analysis and Prerequisite: Mgt 261.

264 **Organizational Dynamics Simulation and Metasystemic Modeling** (3) Ericson, Adams, Umpleby

Literature review and current practice analysis. Operation research and conventional modeling techniques, including iconic, analog, and symbolic. Computerized organization dynamics simulation as a management tool. Institutional structure simulation and metasystemic modeling developed by students. Evaluation of organization dynamics modeling and the state of the science and art of computer simulation. Problems and prospects. Prerequisite: Mgt 261.

265 **Research Seminar in GEMSOC Theory** (3) Ericson, Adams, Umpleby

For doctoral students only. Advanced seminar for research into latest advances in theoretical bases of general systems management and organizational cybernetics. Investigations into sources of GEMSOC concepts in literature of traditional fields. Evaluation of related synthetic and hybrid disciplines, such as bionics. Extensions of existing theory into new areas, such as managerial axiology. Prerequisite: Mgt 261.

266 **Philosophic and Policy Issues in Institutional Articulation** (3) Ericson

Need for greater institutional coherence of managerial decision-making in an "only one world" frame of reference. Systemic articulation and metasystemic planning: the deliberate evolution of more effective institutional forms. Desiderata for responsive institutional structures, from a general human systems view point. Reconciliation of organizational/human participant value conflicts as a general management systems problem. Institutional sovereignty, organizational morality and human values: the search for systemic optimality.

290 **Special Topics in Management Science** (3) Staff

Experimental offering; new course topics and teaching methods. May be repeated once for credit. (Fall or spring)

295 **Research Methods** (3) Staff

Research techniques, sources of information, array and analysis of data, interpretation and presentation of the findings. (Fall and spring)

298 **Directed Readings and Research in Management Science** (3) Staff

(Fall and spring)

299 **Thesis Seminar** (3) Staff

(Fall and spring)

300 **Thesis Research** (3) Staff

(Fall and spring)

URTH GROUP

390 **Philosophical Foundations of Administrative Research** (3) Lauter

Philosophy of science as applied to research in administration. Topics include the nature and current problems of epistemology, the development and role of theories and the relationship between theory, methodology and empirical data. (Fall and spring)

391 **Methodological Foundations of Administrative Research** (3) Lauter

Examination of the process of social science research. Use of models

and theoretical frameworks in research; formulation of research qu
tions, hypotheses, operational definitions, research design, sampl
methods and data analysis approaches. Primary emphasis on the devel
ment of dissertation proposals. (Fall and spring)

398 **Advanced Reading and Research** (arr.)

Limited to doctoral students preparing for the general examination. M
be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to doctoral candidates. May be repeated for credit. (F
and spring)

Mathematics

Professors D. Nelson (*Chairman*), T.P.G. Liverman, H. Kenyon, C. Taam
Professorial Lecturers D.M. Dribin, A. Thaler
Associate Professors W.A. Smith, D.R.K. Henney, I. Katz, I.I. Glick, M
Green, R.L.A. Bari, M.P. Lee, H.D. Junghenn
Associate Professorial Lecturers S.L. Brodsky, M.E.I. Morris
Assistant Professor E.A. Stone
Assistant Professorial Lecturer P.L. Hayes

Bachelor of Arts or *Bachelor of Science with a major in Mathematics (De
mental).*—The following requirements must be fulfilled.

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—Math 31, 32, 33 (Math 30, a prerequisite to Math
may be waived upon examination before registration).
3. Required courses in the major—a minimum of 24 semester hours of se
group courses in mathematics, including Math 106, 121, 123, 139 and 14
also strongly recommended that students take French, German, or Russian
mathematically related courses in such subjects as physics, statistics, econo
and engineering.

Bachelor of Arts or *Bachelor of Science with a major in Applied Mathem
(Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—Math 31, 32, 33. (Math 30, a prerequisite to Math
may be waived upon examination before registration).
3. Required courses in related areas:

(a) Stat 189–90.

(b) Eighteen semester hours to be selected, in consultation with the
from the following Areas of Application. At least 12 semester hours must be
from one Area, and the other 6 semester hours must be chosen from courses
bered 101 or higher. For courses in applied science, civil engineering, ele
engineering and computer science, engineering administration, mechanics
neering, and operations research, see the *School of Engineering and Applied
Catalogue*.

Area 1 Social and Management Sciences—courses chosen from ApSc
183, 197, Econ 1–2, 101, 102, 123, 199, EAd 261, 269, 281–82, 283, 284, F
283, 284, 285; Math 101, 102, 113, 124, OR 201, 209, 251, 252, 261, 2
281, 291; Stat 110, 117, 118, 131, 157–58, 159, 161–62, 165–66, 188, 197

Area II. Engineering and Physical Sciences—courses chosen from Chem 111–12, 14, CE 120, 123, 140, 166, 167, 168, 185, 190, 191, 192, 193, 198, 201, 202, 203, 204, 205, 206, 207, 210, 220, 223, 252, 254, 258, 261, 262, 263, 275; EE 117, 118, 131, 157–58, 159, 161–62, 197; and any course offering in electrical engineering and computer science, mechanical engineering or physics.

Area III. Computer Sciences—courses chosen from EE 152, 153, 154, 157, 158; Math 101, 113, 124, 142, 153, 154, 157, Stat 110, 157–58, 161–62, 165–66, 197.

4. Required courses in the major—a minimum of 24 semester hours of second-group courses in mathematics, including Math 111, 112, 139, 140, 181–82. It is also strongly recommended that students take French, German or Russian.

Master of Arts in the field of Mathematics.—Prerequisite: a bachelor's degree with a major in mathematics from this University, or an equivalent degree.

Required: the general requirements, pages 95–102. Students must complete 30 semester hours of approved course work with or without a thesis.

Master of Arts or Master of Science in the field of Applied Mathematics.—Prerequisite: a bachelor's degree with a major in mathematics or a related field such as statistics, a physical science, engineering or economics.

Required: the general requirements, pages 95–102. Course work is divided between mathematics courses and courses from one area of application—economics, engineering (civil, computer science, electrical, engineering administration, mechanical or operations research), physics, statistics, urban and regional planning. Courses in the chosen area of application are selected in consultation with the relevant department.

Candidates for the degree of Master of Arts must complete 30 semester hours of approved course work, including Math 299–300 *Thesis Research*. At least 15 semester hours must be in mathematics courses, with no more than 3 of these from second-group courses. The remaining courses are chosen from the selected area of application. Theses are jointly supervised by the department of mathematics and the department concerned with the area of application.

Candidates for the degree of Master of Science must complete 30 semester hours course work: at least 15 of these must be in mathematics courses, with no more than 6 semester hours from second-group courses. There is no thesis requirement.

Master of Science for Teachers—Prerequisite: A bachelor's degree; at least 12 semester hours or equivalent in mathematics courses, including the equivalent of Math 31; experience in teaching mathematics at the secondary school level.

Required: 30 semester hours of approved second- or third-group mathematics courses, including Math 168.

Doctor of Philosophy in the field of Mathematics.—Required: the general requirements, pages 95–97, 102–104. The department doctoral program committee, after consultation with the student, will stipulate (1) courses which must be taken to meet the 48-semester-hour requirement leading to the General Examination; (2) the two languages, selected from French, German and Russian, which must satisfy the foreign language requirement; and (3) the four areas of study in which the student must prepare for the General Examination. The doctoral program committee will appoint a Director of Research when the student has selected (preferably early in the program) one of the following research fields for the dissertation: functional analysis (abstract differential equations, functional equations, generalized functions, groups of operators), group representations, linear algebra (matrix theory), real analysis, measure and integration, ordinary and partial differential equations, theory of numbers, and topology (general topology, analytic topology, topological groups).

Bachelor of Arts in Education with a teaching field in Mathematics.—Prerequisite: the education curriculum, pages 81–82.

Required: the mathematics option and the professional courses listed on pages 125, 126.

FIRST GROUP

3 College Algebra (3) — Morris and Staff

Equivalent to the standard two years of high school algebra with several additional topics. Prerequisite: one year each of high school algebra and high school geometry. (Fall and spring)

6 Plane Trigonometry (3) — Morris and Staff

Prerequisite: two years of high school algebra and one year of high school geometry, or Math 3 (or concurrent registration therefor). (Fall and spring)

9 General Mathematics I (3) — Smith and Staff

For students electing Math 9 and 10 as a terminal sequence. Logic, sets, number systems. Prerequisite: two years of high school mathematics. (Fall and spring)

10 General Mathematics II (3) — Smith and Staff

Mathematical systems, geometry, and introduction to statistics and probability. Prerequisite: Math 9. (Fall and spring)

30 Precalculus (3) — Bari and Staff

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students must take a placement examination in algebra and trigonometry. (Fall and spring)

31 Calculus of One Variable (3) — Kenyon and Staff

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent. (Fall and spring)

32 Calculus of Several Variables (3) — Kenyon and Staff

Vectors, determinants, partial derivatives, multiple integrals, infinite series. Prerequisite: Math 31. (Fall and spring)

33 Calculus of Vector Functions (3) — Kenyon and Staff

Curves. Differential equations, infinite series, vector calculus, line integrals, Green and Stokes theorems. Prerequisite: Math 32. (Fall and spring)

†51 Mathematics for the Social and Management Sciences I (3) — Glick and Staff

Notion of function, graph of function; sequences; differential calculus of functions of one variable; exponential and logarithmic functions. Prospective students must take a placement examination in algebra prior to registration. (Fall and spring)

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* Math 30 may be waived as a prerequisite by examination on scheduled dates.

† Social and management science students with a strong record in high school mathematics are advised to take Math 31, 32, and 124 instead of Math 51 and 52 or 53 and 54

*52 **Mathematics for the Social and Management Sciences II** (3) — Glick and Staff

Integral calculus of functions of one variable; functions of several variables; partial derivatives, maxima and minima, Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51 or 53. (Fall and spring)

*53 **Mathematics for the Life, Social and Managerial Sciences I** (4) — Liverman and Staff

Lecture (3 hours), laboratory (2 hours). Same topics as Math 51 with computer applications and introduction to Fortran programming. Computer work emphasizes motivation of basic mathematical concepts and applied problems in indicated areas for which mechanical computation is essential. New students must take a placement examination in algebra prior to registration. (Fall and spring)

*54 **Mathematics for the Life, Social and Managerial Sciences II** (4) — Liverman and Staff

Lecture (3 hours), laboratory (2 hours). Same topics as Math 52 with computer applications. Computer work emphasizes motivation of basic mathematical concepts and applied problems in indicated areas for which mechanical computation is essential. Prerequisite: Math 53. (Fall and spring)

SECOND GROUP

101 **Introduction to Mathematical Logic** (3) — Nelson

Introduction to proof theory and model theory of propositional and predicate calculi, computability, topics from foundations of mathematics. Open to sophomores with permission of Department. Prerequisite: Math 32 or permission of instructor. (Fall)

102 **Axiomatic Set Theory** (3) — Nelson

Zermelo-Fraenkel set theory, ordinals and cardinals, foundations of the real number system. Prerequisite: Math 101 or permission of instructor. (Spring, even years)

104 **Mathematics and Human Thought** (3) — Dribin

Philosophical and historical aspects of mathematics and its interplay with other disciplines from antiquity to modern times. Prerequisite: two years of high school mathematics. (Spring)

106 **Introduction to Topology** (3) — Kenyon

Prerequisite: Math 139 or permission of instructor. (Spring)

107 **Introduction to Algebraic Topology** (3) — Barr

Prerequisite: Math 122 and 139, or permission of instructor. (Fall, even years)

111 **Mathematics for Engineers and Physicists I** (3) — Henney and Staff

Linear differential equations, linear algebra, Fourier series and integral, nonlinear differential equations of the first order. Prerequisite: Math 32. (Fall)

* ...ical and management science students with a strong record in high school mathematics are advised ... take Math 31, 32, and 124 instead of Math 51 and 52 or 53 and 54.

112 **Mathematics for Engineers and Physicists II** (3) Henney and Sta

Ordinary differential equations, systems of differential equations, bou dary-value problems, partial differential equations. Prerequisite: Ma 111. (Spring)

113 **Graph Theory** (3) Bari and Sta

Directed and undirected graphs; bridges, cutpoints, and blocks; conne tivity; partitions; Eulerian and Hamiltonian graphs; planarity; colori problems. Prerequisite: Math 32.

121–22 **Introduction to Abstract Algebra** (3–3) Lee and Sta

Selected topics in elementary number theory, groups, rings (includi polynomial rings), and fields. Open to sophomores with permission Department. Prerequisite: Math 32 or permission of instructor. (Academic year)

123 **Linear Algebra** (3) Lee and Sta

Theory of vector spaces, linear transformations, and matrices. Quadra and bilinear forms, spectral decomposition. Prerequisite: Math 121. (Fall)

124 **Introduction to Matrix Theory** (3) Liverm

Operations on matrices, linear equations, matrix inversion, vector spac characteristic roots and vectors. Hamilton-Cayley Theorem. Systems linear difference and differential equations. Quadratic forms requisite: Math 32 or permission of instructor. (Fall and spring)

125 **Linear Programming** (3)

Simplex algorithm, degeneracy, the assignment problem, duality theore post-optimality, the transportation problem, integer programming, appli tions. Prerequisite: Math 123 or 124, or equivalent. (Spring)

134 **Introduction to Boundary-value Problems** (3)

Prerequisite: Math 111 or 142. (Spring, odd years)

135 **Projective Geometry** (3)

Prerequisite: Math 123 or 124, or equivalent. (Fall, odd years)

139 **Advanced Calculus I** (3)

Review and extension of elementary one-variable calculus, emphasi the theoretical foundations; differential calculus of several variables requisite: Math 33. (Fall and spring)

140 **Advanced Calculus II** (3)

Differential and integral calculus of several variables; contraction implicit function and differential equation theorems. Prerequisite 139 or equivalent. (Spring)

141 **Advanced Calculus III** (3)

Tensors, differential forms, Stokes theorem, introductory differ geometry. Prerequisite: Math 140. (Fall)

142 **Theory of Differential Equations** (3)

Linear and some nonlinear differential equations. Topics include ex

theorems, stability, control theory, limit cycles, and applications to physics and ecology. Prerequisite: Math 139 and 123 or 124, or permission of instructor. (Spring)

153 **Introduction to Numerical Analysis** (3) Brodsky

Introduction to fundamentals of numerical analysis using modern digital computers. Solution of linear systems and of ordinary differential equations. Interpolation polynomials. Iterative solution of nonlinear equations. Simple quadrature techniques. Prerequisite: Math 111 or 139, or equivalent. (Fall, even years)

154 **Difference Equations** (3) Brodsky

Introduction to finite differences equations and their solution. Physical examples and analogies with differential equations are employed to motivate and apply the techniques developed. Generating functions. Analysis of error and stability characteristics. Prerequisite: Math 111 or 139, or equivalent. (Spring, odd years)

157 **Introduction to Complex Variable Theory** (3) Henney and Staff

Prerequisite: Math 139. (Spring)

168 **Seminar: Curriculum Studies** (3) Bari and Staff

Open only to candidates for the degree of Master of Science for Teachers, teachers for in-service training or students recommended by the department of education. Critical examination of secondary school mathematics, curricula, techniques and programs. Prerequisite: Math 31 and permission of instructor.

181–82 **Seminar: Applied Mathematics** (3–3) Glick

Prerequisite: Math 140, Stat 189–90, some knowledge of linear algebra, senior status as major in Applied Mathematics. (Academic year)

191 **Special Topics** (arr.) Staff

Admission by permission of instructor. May be repeated for credit. (Fall or spring)

195 **Reading and Research** (arr.) Staff

Under the personal direction of an instructor. Limited to Mathematics and Applied Mathematics majors with demonstrated capacity. Prior approval of instructor required. May be repeated for credit (Fall or spring)

THIRD GROUP

Requirements for graduate degrees in mathematics at George Washington University are described on pages 384–85. Courses in mathematics for the fulfillment of these requirements are given jointly by Catholic University of America, George Washington University and Georgetown University each year at one location (1976-77—George Washington University; 1977-78—Catholic University of America).

Courses marked with an asterisk (*) are offered every year.

1976-77 TEACHING STAFF FROM COOPERATING UNIVERSITIES

Catholic University of America

Professors Victor Bogdan, Parfeny Saworotnow
Associate Professors Gustav Hensel, Francis Sullivan, John Welch
Assistant Professors Charles Byrne, Leonard Gallagher, Daniel Gallo, James Hagler, Charlene Williams, John Baillieul

Georgetown University

Professors John Lagnese, Herbert Maisel, Arnold Stokes
Associate Professors E. Ray Bobo, Richard Datko, J. Roger Teller
Assistant Professors George Benke, Giuliano Gnugnoli, Bruce Orcutt, Ronald Rosier, Allen Tucker, James Sandefur, Andrew Vogt

ALGEBRA

*201 **Graduate Algebra I** (3)
Groups, including Sylow theorems, direct decomposition of finitely generated Abelian groups, solvable nilpotent and simple groups, free groups. (Fall)

*202 **Graduate Algebra II** (3)
Rings, including prime and maximal ideals, Euclidean and unique factorization domains, polynomial rings; modules over rings, including tensor product; semi-simple rings and algebras, including the Wedderburn theorem; Noetherian rings, including primary decomposition theorem. Prerequisite: Math 201 or permission of instructor. (Spring)

203 **Graduate Algebra III** (3)
Fields, including Galois theory, valuation theory. Prerequisite: Math 202 or permission of instructor. (Fall)

204 **Rings and Homology** (3)
Prerequisite: Math 202 or permission of instructor.

205 **Homological Algebra and Category Theory** (3)
Categories, functors, natural transformations; examples; functor categories, quotient categories; universal arrows, limits; adjoint functors, theorems (triples); Abelian categories; imbedding theorems; modules, projective and injective; extensions and satellites, Ext and Tor. Prerequisite: Math 202 or permission of instructor.

206–7 **Quadratic Forms I–II** (3–3)
Prerequisite: undergraduate course in linear algebra.

208 **Combinatorics** (3)
Prerequisite: undergraduate modern algebra and linear algebra.

209–10 **Representations of Groups I–II** (3–3)
Prerequisite: Math 202 or permission of instructor.

211 **Group Theory I** (3)
Infinite Abelian groups. Topics include direct sums and products,

Abelian and finitely generated Abelian groups, divisible groups, pure subgroups and basic subgroups. Prerequisite: Math 201.

212 **Group Theory II** (3)

Prerequisite: Math 211.

213 **Nonassociative Algebras** (3)

Lie and Jordan algebra. Prerequisite: Math 202.

214 **Algebraic Number Theory** (3)

Prerequisite: Math 203 or permission of instructor.

215 **Topics in Algebra** (3) Lee

New topic each semester. May be repeated for credit. (Fall and spring)

216 **Graph Theory** (3)

Selected topics in graph theory from introductory topics to problems currently of research interest.

ALYSIS AND APPLIED MATHEMATICS

217–18 **Mathematical Methods for the Social Sciences I-II** (3–3) Liverman, Glick

Topics: convex sets and functions; nonlinear programming; systems of ordinary differential equations and difference equations and stability theory; calculus of variations; optimal control theory; graph theory; Markov chains and other stochastic processes; mathematical learning theory. Prerequisite: Math 32, 124 or equivalent, graduate standing in a social science department, or permission of the instructor. (Academic year)

*220 **Introduction to Modern Analysis** (3) Williams

Real numbers, least upper bounds, completeness, Bolzano-Weierstrass theorem; Banach spaces, examples: R^n, C [a, b], l_1, l_2. Hilbert spaces: limits of real and vector sequences, limits of real and vector functions, all basic properties of real and vector continuous functions, differentiation and integration of real and vector functions, basic properties of compact sets, closed and open sets, linear transformations on R^n to R^m, fixed-point theorem and applications to differential and integral equations, Fourier series, Stone-Weierstrass theorem. (Fall)

*221 **Introduction to Complex Analysis** (3) Sandefur

Algebra, geometry, and topology of complex numbers; definitions and properties of elementary functions, e.g., e^z, sin z, log z; integrals, functions defined by integrals; Cauchy's theorem and formula, integral representation of derivatives of all orders; maximum modulus, Liouville's theorem, fundamental theorem of algebra; Taylor and Laurent series; uniform convergence, term-by-term differentiation; domain of convergence and classification of singularities; contour integration; the residue theorem; evaluation of integrals involving single-valued functions; analytic continuation, multivalued functions, and branch points; technique for contour integrals involving multivalued functions. Prerequisite: Math 220 or equivalent. (Fall)

222 **Applications of Complex Analysis** (3)

Potential theory and conformal mapping. Special functions. Asymptotic expansions; steepest descent, stationary phase, and WKB methods. Fourier and Laplace transforms, applications to partial differential equations. Wiener-Hopf method, dual and singular integral equations. Prerequisite: Math 221 or an undergraduate course in complex variables.

223 **Advanced Complex Analysis** (3) Sandefur

Harmonic functions, partial fractions, Mittag-Leffler theorem; infinite products, entire functions, the Hadamard product theorem, the gamma function, representations of the gamma function; Hurwitz's theorem; normal families of functions, Montel's theorem, the Riemann mapping theorem, elementary conformal mapping; analytic continuation, the monodromy theorem, branch points, Riemann surfaces. Prerequisite: Math 221 or equivalent. (Spring)

*224 **Measure and Integration Theory** (3) Williams

Lebesgue integration over the space of reals; the basic convergence theorems, including monotone and dominated convergence theorems; measurability; almost everywhere differentiability of monotone functions; absolute continuity; the Lp spaces and orthogonal expansions; duality of Lp and Lq spaces; orthonormal systems in L. (a, b); integration over the space R^n; theorems of Fubini and Tonelli. Prerequisite: Math 220 or equivalent. (Spring)

*225 **Introduction to Functional Analysis** (3) Taar

Topological and metric spaces; compact spaces and Tychonoff theorem; complete metric spaces and completion of a metric space; Normed and Banach spaces; linear functions; Hahn-Banach theorem; principle of uniform boundedness and applications; elementary introduction to distribution theory; linear operators; the closed-graph theorem and inverse mapping principle; Hilbert spaces; inner product, orthogonality, and orthonormal systems; eigenvalues, eigenvectors, invariant subspaces, and projection operators; operational calculus of functions defined on the spectrum. Prerequisite: Math 220 or equivalent. (Fall)

*226 **Banach Algebras and Spectral Theory of Operators** (3) Taar

Gelfand theory of commutative Banach algebras; function algebras; Stone Cech compactification; application to the spectral theory of operators, spectral theorem for bounded and unbounded operators; Jacobson radical for arbitrary Banach algebras; H^*-algebras and Hilbert modules; related topics. Prerequisite: knowledge of measure and integration, introduction to functional analysis, and Tychonoff and Stone-Weierstrass theorems. (Spring)

227 **Fourier Analysis on Locally Compact Groups** (3) Beg

Elementary properties of topological groups, existence of Haar measure, modular functions, group algebras; application of Gelfand theory to the group algebra, applications to classical theory of Fourier series and integrals; compact and discrete groups, Plancherel and Pontryagin theorems; positive definite functions and positive linear functionals, Gelfand and Bochner theorems, representations of a compact group G; H^*-algebra valued positive definite functions, generalization of Stone and Bochner theorems, their application to multivariate and infinite dimensional

tionary processes; related topics. Prerequisite: knowledge of topological groups, measure and integration, and introduction to functional analysis, and some familiarity with Gelfand theory. (Fall)

228 **Theory of Generalized Functions and Distributions** (3)

Fréchet and countable union spaces; definition, structure, and properties of Schwartz distributions and generalized functions; applications to explicit solutions and existence theory of ordinary and partial differential equations, nested Hilbert spaces; generalized Fourier transform. Prerequisite: Math 220 or permission of instructor.

229 **Ergodic Theory** (3) Junghenn

Topics selected to serve research interests of instructor and students; emphasis on recent developments and applications to dynamical systems and Markov processes. Prerequisite: Math 224, 225; or permission of instructor. (Fall)

230 **Differential Equations in Banach Space** (3)

General theory of linear and nonlinear differential equations in Banach space; periodic and almost periodic solutions; stability of solutions. Prerequisite: Math 225 or permission of instructor.

231 **Semi-groups of Operators and Almost Periodic Functions** (3)

Almost periodic functions on the real line and on groups; general theory of weakly almost periodic semi-groups of operators, their asymptotic behavior and convergence into almost periodic groups of operators. Prerequisite: Math 224, 225, 226; or permission of instructor.

232 **Seminar: Functional Analysis** (3) Hagler, Sullivan

Topics selected to serve research interests of instructor and students; qualified students encouraged to work on research projects. Topic for fall 1976 and spring 1977: geometry of Banach spaces. May be repeated for credit. Admission by permission of instructor.

233 **Foundations of Probability Theory and Statistics** (3)

Review of the basic concepts of measure and integration theory; probability and expectation; random variable, random process; distribution function and Kolmogorov consistency theorem; characteristic function of a random variable; distributions of Bernoulli, Poisson, Gauss, Polya, Cauchy, Laplace; applications; stochastic independence; Kolmogorov's strong law of large numbers; central limit theorem; applications to statistics.

234 **Introduction to the Theory of Random Processes** (3)

Stochastic dependence, conditional expectation, limit theorem for submartingales; Markov process; theory of Markov chains; Poisson's process; process of birth and death; Kolmogorov-Chapman equations; second-order stationary random processes; filtering and prediction; Wiener-Hopf equation and its solution; second-order discrete stationary random processes. Prerequisite: Math 233.

235 **Linear Algebra** (3) Saworotnow

Vector spaces, affine spaces; linear transformations, invariant subspaces; matrices, determinants, tensor products, inner product spaces, orthogonality, linear functionals, dual spaces, adjoint transformations; spectral theorem; quadratic forms; Hilbert spaces. (Fall)

236-37 **Introduction to Optimization Theory in Hilbert Spaces I-II** (3–3)

Basic methods of functional analysis applicable to optimization problems in control, communication, and other areas in system science. Topics covered include review of basic properties of Hilbert spaces, operators, compact and nuclear operators, semigroups of linear operators, measure theory in Hilbert spaces, problems in control theory, information theory, convex programming and games. Prerequisite to Math 236: Math 225. Prerequisite to Math 237: Math 236.

238 **Introduction to Probability Theory** (3)

Discrete and continuous probability distributions; conditional probability; random variables; expectation; binomial, Poisson, and normal distributions; laws of large numbers; Markov chains; applications. Prerequisite: knowledge of advanced calculus.

239 **Introduction to Stochastic Processes** (3)

Brief discussion of probability theory, general notion of stochastic process, normal processes and autocovariance function, Wiener process, harmonic analysis of processes, Poisson process, renewal counting processes, Markov chains with discrete and continuous parameter.

*240 **Introduction to Ordinary Differential Equations** (3)

First course in ordinary differential equations; existence and uniqueness of solutions; continuity of solutions with respect to initial conditions; properties of linear systems. Prerequisite: advanced calculus.

241 **Stability Theory of Ordinary Differential Equations** (3)

Introduction to basic notions of stability and asymptotic stability; Liapounov's functions used to establish stability or instability; converse theorems of Liapounov's direct method; comparison theorems, differential inequalities. Prerequsite: Math 240 or permission of instructor.

242 **Theory of Dynamical Systems** (3)

Basic properties of dynamical systems; α and ω limits sets, recurrent motions, minimal sets; ergodic motions, ergodic theorems of Birkhoff and Von Neumann. Prerequisite: Math 240 or permission of instructor.

243 **Theory of Nonlinear Oscillations** (3)

Existence and stability of periodic solutions of ordinary differential equations, derivation of bifurcation equation for weakly nonlinear systems; introduction to the method of averaging, the existence and stability of almost periodic solutions and integral manifolds. Prerequisite: Math 240 or permission of instructor.

244 **Theory of Differential Equations with Delays** (3)

Basic theory of functional differential equations (differential-difference equations, equations with delay), theory of linear systems, constant and periodic coefficients, stability theory, Liapounov functionals; existence and stability of periodic and almost periodic solutions. Prerequisite: Math 240 or permission of instructor.

245 **Eigenvalue and Boundary-value Problems** (3)

Normed spaces, integral equations, spectral theory of compact operators

application to boundary and eigenvalue problems of ordinary differential equations. Prerequisite: advanced calculus. (Spring)

246 **Numerical Methods in Ordinary Differential Equations** (3)

Finite difference methods for initial-value and boundary-value problems; error analysis, analysis of stable schemes; Galerkin's method, with estimation of error in eigenvalue problems. Prerequisite: Math 240 or permission of instructor.

247 **Control Theory of Ordinary Differential Equations** (3) Baillieul

Optimal control of linear systems, control of linear systems with convex cost functionals, the maximal principle and selected topics on control systems. (Spring)

248 **Fourier Analysis and Integral Transforms** (3)

Fourier series, Fourier integral in one and several variables, Fourier-Stieljes transform, inversion of Fourier transforms, Tauberian theorems, bilateral Laplace transform and applications. Prerequisite: advanced calculus, knowledge of Lebesgue integration, acquaintance with the elementary parts of the theory of functions of a complex variable.

249 **Differential Games** (3)

The idea of a differential game. Examples, discrete games, procedures for solving certain types of games, and the study of surfaces involved in solving differential games.

250 **Calculus of Variations** (3) Bogdan

Introduction to the calculus of variations via the notion of the Frechet derivative, the Euler equations, the Hamilton-Jacobi equations; sufficient conditions for a solution to exist, applications to mechanics and physics. (Spring)

251–52 **Techniques of Partial Differential Equations I-II** (3–3)

Math 251: Study of classical first and second order equations in two to four variables. Applications to probability theory and mathematical physics. Prerequisite: knowledge of advanced calculus and rudiments of linear algebra and complex variables. Math 252: First order equations and systems in n variables. Hamilton-Jacobi theory. Characteristics and bicharacteristics. Variational methods. Integral equations. Prerequisite: Math 251, knowledge of undergraduate linear algebra and analytic function theory.

253–54 **Introduction to Numerical Analysis I–II** (3–3)

Elements of theory and practice of numerical analysis using modern digital computers; solution of linear systems and nonlinear equations; computation of eigenvalues and eigenvectors; basic approximation theory; interpotation techniques; numerical quadrature; solution of differential equations. Prerequisite: knowledge of advanced calculus.

255 **Introduction to Generalized Functions and Fourier Transforms** (3) Liverman

Sequential definition of generalized functions—operational solution of differential equations and systems. Generalized function Fourier series, generalized function Fourier and Laplace transforms, applications to initial and boundary-value problems. Prerequisite: Math 220 or knowledge of advanced calculus. (Spring)

256 Integral Equations (3)

Volterra linear integral equations of first and second kind with applications to linear ordinary differential equations; Fredholm linear integral equations of first and second kind, applications to Sturm-Liouville problems; some singular or nonlinear integral equations.

257 Control Theory of Partial Differential Equations (3)

Minimization of functionals and boundary-value problems; control of systems governed by elliptic partial differential equations; control of systems governed by parabolic partial differential equations; control of systems governed by hyperbolic partial differential equations; regularization, approximation, and penalization.

258 Introduction to Finite Element Methods (3) Sullivan
(Formerly Numerical Methods of Partial Differential Equations)

Numerical treatment of the typical boundary-value problems for parabolic and elliptic equations of mathematical physics; finite element methods, solutions, convergence to solutions of partial differential equations, error analysis, suitability of methods for practical use in digital computers. (Spring) Voi

259–60 Introduction to System Theory: Control and Optimization I–II (3–3)

Analysis of control systems of various types. States and system dynamics and problems of control and optimization. Prerequisite: background in advanced calculus and linear algebra. (Academic year)

By

261 Applied Linear Algebra (3)

Application of linear algebra to problems occuring in ordinary differential equations, stochastic processes, control theory, and the social and life sciences. (Spring) Gallagh

262 Linear Programming (3)
(Formerly Convex Sets with Applications)

Study of convexity and its application to linear programming. (Fa

Sulliv

264 Approximation and Curve Fitting (3)

General introduction to theory and computational methods of linear approximation; emphasis on least squares and uniform approximation including discussion of computer implementation of widely used algorithms; programming assignments dealing with typical applications. Prerequisite: knowledge of advanced calculus. (Fall)

265 Computational Methods for Nonlinear Problems (3)

Topics in the area of optimization and function minimization; emphasis on analytic and computational aspects of nonlinear iterative methods; their applications to various physical problems; programming assignments dealing with typical applications. Prerequisite: knowledge of advanced calculus.

†**266 Computer Mathematical Languages with Applications I** (3)

Timesharing system. Elements of BASIC: syntax, numerical scale, error estimates in computation. Elements of PIP, TECO, and MONITOR COMMANDS. FORTRAN IV: syntax, numeric scales and their

† This course is not intended for computer sciences specialists.

Subroutines; local and global variables; function subroutines. Applications. Use of subroutine libraries. Business type applications. Prerequisite: knowledge of calculus.

†267 **Computer Mathematical Languages with Applications II** (3)

Review of timesharing system, PIP, TECO, MONITOR COMMANDS, FORTRAN IV, ALGOL. Control of peripheral devices from FORTRAN, ALGOL, and file capability. Generation of programs in MONITOR LEVEL and their applications. Use of system utility programs. Prerequisite: knowledge of advanced calculus and elements of FORTRAN or BASIC.

268 **Introduction to Applied Mathematics** (3)

Sampling of topics in applied mathematics treated in an introductory manner with emphasis on interest rather than technique; the two-body problem, Hamiltonian and Lagrangian formalism, heat and wave equations, matrix models in biology and economics.

COMPUTER SCIENCE

270–71 **Simulation of Discrete Stochastic Systems I–II** (3–3) Maisel

Introduction and definition of simulation system, discrete and continuous, stochastic and deterministic, critical event and time-slice; general outline of a simulation, how it is used and how it functions; procedure for developing a simulation; statistical topics; generating random numbers. Simulation programming and languages, simulating the passage of time and arrivals, FORTRAN, queues and list processing, PL/1, SIMSCRIPT, GPSS, general remarks; GPSS, basic concepts; simulation of computer systems; case study. Prerequisite: knowledge of computers and statistics. (Academic year)

272 **File and Data Management and Information Processing** (3)

External data structures, graph theory, paths, chains, trees, lists, sublists, multilinked lists, directories; basic structure-processing operations, creation, updating, sorting, merging, searching linkage, hashing, Boolean searches; storage media and input/output devices; software; introduction to file organizations: consecutively organized files; keyed files; file arrangement and application; introduction to the processing, storage, and retrieval of data, emphasis on computer techniques. Prerequisite: introduction to data structures and PL/1 programming.

273 **Theory of Formal Languages and Applications** (3)

Introduction to formal languages and their related automata, applications in compiler design. Regular, context-free, context-sensitive, and unrestricted grammars; finite and pushdown store automata; Turing machines; the halting problem; formal description of programming languages' syntax and semantics; syntax-directed compiling techniques; compiler-compilers; additional topics in compiler construction. Prerequisite: introductory computer course; course in abstract algebra is recommended.

† Not intended for computer sciences specialists

274 **Compiler Construction** (3)
Prerequisite: Math 273.

275 **Operating Systems** (3)
Prerequisite: introduction to systems programming. Intermediate cal
culus, college algebra, proficiency in FORTRAN or PL/1 programming
(Spring) Maisel

276 **Artificial Intelligence** (3)
Heuristic and the algorithmic methods of programming, theorem-proving
pattern recognition, verbal and concept learning simulators and decision
making. Prerequisite: beginning course in computers and statistics
(Fall) Tucker

277 **Comparative Computer Organization** (3)
Arithmetic and nonarithmetic processing facilities, memory utilization
and storage management, addressing schemes, control mechanisms, input
output facilities and special design features. Prerequisite: background in
computer organization and assembly language programming. (Spring

LOGIC

Nelson

*278 **Introduction to Mathematical Logic** (3)
Propositional and predicate calculus (first order): syntax, formation rules
semantics, axioms, proof and deduction, object vs. metalanguage, deduc
tion theorem, compactness theorem, Godel-Henkin completeness theorem
Craig's interpolation theorem, Beth's definability theorem. First-orde
recursive arithmetic: incompleteness and undecidability. (Fall)

279 **Model Theory** (3)
Prerequisite: Math 278 or permission of instructor.

280 **Proof Theory** (3)
Prerequisite: Math 278 or permission of instructor.

281 **Computability and Decidability** (3)
Prerequisite: Math 278 or permission of instructor.
Hen

282 **Set Theory** (3)
Prerequisite: Math 278 or permission of instructor. (Spring)

283 **Topics in Computational Complexity** (3)
Prerequisite: Math 278 or permission of instructor.

TOPOLOGY

Hal

*285–86 **General Topology I–II** (3–3)
General topological spaces, continuity, quotient spaces, product spac
filters, nets, separation axioms, compactness and connectedness (glo
and local). Metrization, compactification, uniform spaces, uniform co
tinuity, complete spaces, and topological groups. (Academic year

287–88 **Topological Vector Spaces I–II** (3–3)

Topological vector spaces, vector space topologies, linear manifolds, metrizability and complexification. Locally convex topological vector spaces, Hahn Banach theorem, projective and inductive topologies, barreled and bornological spaces. Linear mappings, Banach's homomorphism theorem, equicontinuity; uniform boundedness and the Banach-Steinhaus theorem. Tensor products, nuclear mappings and spaces. Duality; dual systems and weak topologies; Mackey-Arens theorem; strong dual, bidual, and reflexive spaces; theorems of Grothendieck, Banach-Dieudonne, and Krein-Smulian; open mappings and closed graph theorems; weak compactness; theorem of Eberlein and Krein. Prerequisite: general topology, including uniform spaces, linear algebra, and real and complex variables.

289 **Topological Groups** (3)

General theory of topological groups; neighborhood systems of the identity; uniform structures on groups, products, and inverse limits. Locally compact groups, classical linear groups, Lie groups. Open homomorphism and closed graph theorems, integration on locally compact groups, finite-dimensional representations of groups Schur's lemma, Peter-Weyl theorem, structure of metrizable compact groups. Duality, dual groups of locally compact Abelian groups, dual groups of compact and discrete groups. Prerequisite: general topology, including uniform spaces, linear algebra, and elementary group theory.

290 **Differentiable Manifolds** (3) Glick

Differentiable manifolds, tangent vectors and differentials, submanifolds, imbeddings and immersions, quotient manifolds, vector fields, Frobenius' theorem, tensors and differential forms, Lie derivatives, manifolds with boundary, orientable manifolds, Stokes' theorem, and the divergence theorem. Prerequisite: advanced calculus, linear algebra; or permission of instructor. (Fall)

291 **Differential Geometry** (3) Glick

Riemannian manifolds, geodesics, curvature and torsion, linear connections, Gauss-Bonnet theorem, Hopf index theorem, Morse index theorem; applications to mechanics, cohomology, and the de Rham theorem; the Laplace-Beltrami operator; Lie groups. Prerequisite: Math 290. (Spring)

292 **Introduction to Homotopy Theory** (3)

Two-dimensional manifolds, classification theorem for compact surfaces, the fundamental group, homotopy type, homotopy equivalence of spaces; free groups and free products of groups, presentation by generators and relations; Seiffert-Von Kampen theorem, covering spaces of a graph, applications to group theory.

293 **Introduction to Homology Theory** (3)

Axioms and uniqueness, Eilenberg-Steenrod axioms and some immediate consequences. Uniqueness theorem. Computation of homology groups, elementary applications, e.g., invariance of dimension, extensions and retractions, fixed-point theorems, etc. Cellular homology groups, singular homology theory.

RESEARCH

Staff

*295 **Reading and Research** (3)
May be repeated once for credit. (Fall and spring)

Staff

299–300 **Thesis Research** (3–3)
(Fall and spring)

FOURTH GROUP

Staff

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

Staff

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Microbiology

Professors M.L. Robbins, R. Hugh, L.F. Affronti (*Chairman*)
Associate Professors M. Reich, K. Huang, P.D. Kind
Assistant Professors R.F. De Giovanni-Donnelly (*Research*), M.R. Lo
(*Research*)

Master of Science in the field of Microbiology.—Prerequisite: a bachelor's degr with a major in biological or physical sciences from this University, or an equivale degree. The undergraduate program must have included the following course or equivalent: BiSc 11–12; Chem 11–12, 151–52, 153–54; Math 30, 31 (31 may taken concurrently with the graduate program); Phys 1, 2.

Required: the general requirements, pages 95–102. A total of 30 semester hour required, 24 hours of course work and 6 hours of thesis (Micr 299–300). The cour work must include Micr 211, 212 (if not presented for admission), plus Bioc 221–2 Micr 219–20, 277–78; and an approved biostatistics course. The remaining academ work should consist of graduate-level courses selected with the approval of th instructor.

Doctor of Philosophy in the field of Microbiology.—Required: the general requir ments, pages 95–97, 102–104. Candidates must fulfill the tool requirement by com pleting an approved course in biostatistics and by passing a reading knowledge exa nation in French or German. The General Examination covers at least four fields, of which must be in microbiological disciplines.

Research fields: clinical microbiology, determinative bacteriology, immunochem istry, immunology, microbial genetics, microbial pharmacology, microbial physiol ogy and virology.

211 **Microbiology** (4)
Bacterial viruses, rickettsiae, fungi, parasites and immunological concepts. Prerequisite or concurrent registration: Bioc 221–22, or other biochemistry course, and permission of instructor. Laboratory fee, $20. (Fall)

212 **Pathogenic Microbiology** (4) Staff

Continuation of Micr 211; emphasis on pathogenic activities of microorganisms. Prerequisite: Micr 211. Laboratory fee, $20. (Spring)

214 **Tissue Cell Culture and Somatic Variation** (4) Chu

Techniques of tissue culture and means of studying somatic variations. Prerequisite: Micr 211 or equivalent. (Spring)

215 **Medical Parasitiology** (1–2) Staff

(Formerly Epid 218)

For graduate students. Study of host-parasite relationships. Clinical recognition of important parasites in medicine.

19–20 **Scientific Writing for Graduate Students** (1–1) Robbins

Required of all graduate students prior to writing a thesis or dissertation. Some research experience required. (Academic year)

225 **Microbial Physiology I** (3) Reich, Affronti

Morphology and biochemistry of various microorganisms with emphasis on bacteria. Prerequisite: Bioc 221–22, Micr 211 or equivalent. (Fall)

226 **Microbial Physiology II** (3) Reich, Affronti

Effects of physical and chemical agents on microorganisms with emphasis on antibiotics. Prerequisite: Micr 225 or permission of instructor. (Spring)

229 **Immunology** (3) Kind, Affronti

Lecture course. Fundamental immunologic concepts. Lecturers will cover antigens, antibodies, antigen-antibody reactions *in vitro* and *in vivo*, and the immune response. Prerequisite: Micr 211 or permission of instructor. (Fall)

230 **Immunology Laboratory** (2) Kind, Affronti

Serologic and immunologic procedures as applied to clinical and research situations emphasized. Prerequisite or concurrent registration: Micr 229, or permission of instructor. Laboratory fee, $20. (Fall)

231 **Immunobiology** (1) Affronti, Kind

Study of immunological functions of reticulo-endothelial tissues, theories of auto-immunity, graft rejection, tumor immunity, delayed hypersensitivities, and immunogenetics. Clinical faculty discuss relevant aspects of immunobiology. Prerequisite: Micr 201* or 229, and permission of instructor. (Fall)

233 **Biology of Viruses** (2) Robbins, Huang

Biochemical and genetic characterization of viruses. Prerequisite: Micr 211 or equivalent. (Fall)

234 **Biology of Viruses—Laboratory** (2) Robbins, Huang

Laboratory complement to Micr 233. Prerequisite or concurrent registration: Micr 233. Laboratory fee, $20. (Fall)

* ...cription of Micr 201 see the *School of Medicine and Health Sciences Catalogue*

Hugh

235 **Systematic Bacteriology** (2)

History of bacterial classification, international rules of nomenclature applied to bacteria, development of bacterial classification based on relationships, survey of characteristics of bacterial groups. Prerequisite: Micr 212 or equivalent. (Fall, odd years)

Staff

*240–41 **Biomedical Instrumentation** (4–4)

Same as Bioc 225–26, ForS 281–82 and Phys 223–24. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification and quantification of materials of interest to biomedical and forensic scientists. Laboratory fee, $50. (Academic year)

Hugh

251 **Clinical Laboratory Bacteriology** (3)

For graduate students; open to medical students. Detection and identification of bacterial agents which cause diseases in man. Comparative isolation and identification methods; emphasis on interpretation and significance of laboratory observations. Prerequisite: Micr 212 or equivalent. (Fall)

Huang

255 **Virology** (1)

General principles of virology; emphasis on clinical situations. Prerequisite: Micr 212 or equivalent. (Fall)

Affronti

257 **Experimental Immunochemistry** (3)

Biochemical and physiochemical characterization of antigens and antibodies. Prerequisite: Bioc 221–22 or equivalent, Micr 229. Laboratory fee, $20. Limited enrollment. (Spring, even years)

De Giovanni-Donnelly

258 **Microbial Genetics** (2)

Survey of microbal systems that depict basic concepts of genetic principles. Prerequisite: Micr 211 or equivalent. (Spring)

Kind

260 **Cellular Immunology** (1)

Advanced seminars in cellular aspects of the immune response. Prerequisite: Micr 229.

Staff

277–78 **Seminar: Microbiology** (1–1)

Required of graduate students. (Academic year)

Staff

293 **Special Topics in Microbiology** (arr.)

Selected topics in microbiology. May be repeated for credit. (Fall and spring)

Staff

295 **Research in Microbiology** (arr.)

Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

Staff

299–300 **Thesis Research** (3–3)

(Fall and spring)

Staff

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

* An interdisciplinary course offered by the departments of biochemistry, forensic sciences, microbiology and physiology.

99 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

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or G. Steiner (*Chairman*), R. Parris
ate Professor N.A. Tilkens
t Assistant Professor M.C. Tolson
nt Professorial Lecturers N.O. Scribner, Jr. (*Organ*), R.J. Guenther
Lecturers in Applied Music W.B. Dobry (*Piano and Organ*), S.K. Kim
no), J.E. Marlow (*Guitar*), M. McNabb (*Piano and Organ*), Y.F.
k (*Piano*), M. Peris (*Piano*), W.D. Petterson (*Piano*), C.A. Russell
no), C.O. Dash (*Voice*), S.H. Prussing (*Voice*), J.E. White (*Voice*),
arnas (*Violin and Viola*), R.J. Ferruzza (*Guitar*), R.A. Norris (*Guitar*),
Raffaelle (*Guitar*), D.C. Jarvinen (*Cello*), J.S. Martin, Jr. (*Cello*),
. Irvine (*Bass*), W.E. Fuhrman (*Flute*), W.H. Mann (*Flute*), T.P.
zzoli (*Flute*), R.O. White (*Oboe*), W.R. Wright (*Clarinet and Saxo-*
ne), L. Lipnick (*Bassoon and Recorder*), W. Maciejewicz (*Bassoon*),
Ramsay (*French Horn*), G.W. Recker (*Trumpet*), R.H. Kraft (*Trom-*
e and Recorder), T.H. Wardlow (*Percussion Instruments*), G.F. Kreplin
itar)

helor of Arts with a major in Music History and Literature, Music Theory
plied Music (Departmental).—The following requirements must be fulfilled:
The general requirements as stated on pages 77–78, 85–91.
Prerequisite courses—Mus 2, 5–6, 6 hours of applied music lessons, a minimum
emesters in music ensemble groups (or evidence of equivalent experience).
Required courses in related areas—12 hours of one foreign language (French,
n or Italian recommended).
Required courses in the major—Mus 103–4, 131–32; 6 additional hours of
theory courses; 6 additional hours of music history and literature courses;
hours of courses in the area of the major. (Music theory majors must meet
mental requirements for proficiency in piano; applied music majors must
m a complete public recital or the equivalent in major solo performances.)

ster of Arts in the field of Musicology.—Prerequisite: a bachelor's degree with
in music, or an equivalent degree.
quired: the general requirements, pages 95–102. The program of study consists
30 semester hours of course work including a thesis (6 semester hours), or
ith the approval of the department, 30 semester hours of course work without
is.

ster of Music in the field of Music Theory, Music Composition, Conducting,
plied Music.—Prerequisite: a bachelor's degree with an undergraduate major
e of the following, at this University, or an equivalent degree: (1) music his-
and literature, (2) music theory or (3) applied music.
quired: the general requirements, pages 95–102. The required second- and
l-group course work is as follows:
In the field of Music Theory.—Thirty semester hours of course work including
e: (a) a thesis (6 semester hours) demonstrating research ability in theoretical,
ctive, or analytical techniques, or (b), with the approval of the department, 6
ester hours of music theory courses in lieu of a thesis.

2. *In the field of Music Composition.*—Thirty semester hours of course work including a creative thesis of one composition in large form properly prepared for performance (chamber music, a symphonic form, or a choral work with orchestral accompaniment) including a written theoretical, formal, and harmonic analysis of the work.

3. *In the field of Conducting.*—Thirty semester hours of course work including a thesis (6 semester hours) demonstrating research ability in theoretical, creative, or analytical techniques; or, with the approval of the department, 30 semester hours of course work without a thesis. The requirements also include an acceptable public conducting performance.

4. *In the field of Applied Music.*—Thirty semester hours distributed as follows: (a) 12 semester hours of applied music in the area of concentration (piano, harpsichord, organ, voice, string or orchestral woodwind instrument); (b) 12 semester hours of music theory and music history and literature courses; and (c) a thesis (6 semester hours). The thesis consists of a public recital or performance before a designated committee—such a recital or performance must be representative of an extensive and well-rounded repertory, performed on a professionally accepted artistic level, including verbal historical and analytical lecture notes on the musical content of the program, demonstrated leadership in an ensemble performance (opera or oratorio for voice); and a written report on some approved theoretical area related to the student's concentration.

Bachelor of Arts in Education with a teaching field in Music.—Prerequisite: the education curriculum, pages 81–82.

Required: the music option and professional courses listed on pages 123, 126

MUSIC HISTORY AND LITERATURE

First Group

Steiner, Tilkens

3 Introduction to Musical Understanding (3)

Introductory history of musical styles, related to listening; elements and materials of music. (Fall and spring)

Steiner

4 Survey of Music Literature (3)

Introductory study of musical forms, structures, and textures; aural analysis of selected literature. (Spring)

Tilkens

7 Music of Nonwestern Cultures (3)

Introductory survey of the basic systems and styles of music in the major cultures of the Eastern Hemisphere and Africa.

Staff

8 History of Jazz (3)

Introduction to the styles, composers, and performers of jazz music from its origins to the present.

Second Group

Tilkens

103–4 History of Music (3–3)

Development of music in the Western World from the early Christian Era to the present. (Academic year)

105 **Music of the Baroque Period** (3) Tilkens
Study of the musical styles, techniques, and literature from 1600 to 1750. (Spring)

106 **Music of the Classic Period** (3) Tilkens
Study of styles, techniques, and literature from the 18th century schools through Haydn, Mozart, and Beethoven.

107 **Music of the Romantic Period** (3) Tilkens
Study of the musical styles, backgrounds, and literature from Schubert through the 19th century. (Fall)

108 **Music of the 20th Century** (3) Steiner
The principal schools, techniques, developments, and trends of the 20th century. (Fall)

109 **Orchestra Literature** (3) Steiner
Survey of the history and styles of orchestra literature, analysis of representative works.

110 **Chamber Music Literature** (3) Steiner
Survey of the history and styles of chamber music literature, analysis of representative works.

121 **The Opera** (3) Staff
Survey of the history and styles of opera, analysis of representative works. (Fall)

125 **Keyboard Music Literature** (3) Tilkens
Survey of the history, style, and major content of the keyboard literature from the 16th century to the present. (Fall)

140 **Music Therapy** (3) Rachal
Introduction to principles and techniques of music therapy. (Summer)

173 **Piano Pedagogy** (3) Tolson
Principles, materials, and methods of piano teaching. (Spring)

199 **Independent Research** (3) Staff
Under the guidance of an assigned instructor. Open only to qualified Music majors. May be repeated for credit (Fall and spring)

ird Group

203 **Bibliography and Research Methodology** (3) Staff
(Fall)

209 **History of Musical Instruments** (3) Steiner

234 **Seminar: Performance Practices in Selected Areas** (3) Staff

238 **Seminar: Analytical Studies in Music History** (3) Tilkens
Topic for 1977: Handel. (Spring)

239 **Independent Research** (3) Staff

MUSIC THEORY

First Group

Staff

1 **Elements of Music Theory** (3)
Notation, scales, keys, intervals, terms, rhythms, and chord structure. (Fall and spring)

Staff

2 **Ear-training** (3)
Melodic and harmonic dictation, ear-training, sight-singing, elementary keyboard harmony. (Spring)

Parris

5–6 **Harmony** (3–3)
Triads, inversions; chord analysis, construction, and progression; part-writing, modulations, altered chords. Prerequisite: Mus 1 or satisfactory passing of placement examination. (Academic year)

Second Group

Parris

131–32 **Advanced Theory** (3–3)
Practice in 18th century contrapuntal writing and analysis, chorale preludes, inventions, and fugues. Prerequisite: Mus 5–6 or equivalent. (Academic year)

Parris

135 **Counterpoint** (3)
Study and practice of 16th century contrapuntal techniques.

Parris

137 **Orchestration** (3)
Instrumental scoring. (Fall)

Parris

138 **Form and Analysis** (3)
Analysis of musical forms in representative musical literature. (Spring)

Steiner

151 **Conducting** (3)
Technique of conducting, score reading, rehearsal procedures, analysis and interpretation of selected musical literature; practice in conducting. (Spring)

Third Group

Parris

231–32 **Composition** (3–3)
May be repeated for credit. (Academic year)

Parris

237 **Seminar: Analytical Studies in Music Theory** (3) (Fall)
Topic for 1976: techniques of 20th century composition.

Steiner

251 **Advanced Conducting** (3)
(Spring)

Staff

299–300 **Thesis Research** (3–3)
(Fall and spring)

PLIED MUSIC

ll applied music courses may be repeated for credit.
ll applied music courses are offered both fall and spring.
ses 51, 52, 53, 54 and 55 do not include individual lessons and do not require a plementary fee. All other applied music courses include individual lessons and ire a supplementary fee, as follows:
One-semester-hour courses: individual lessons of ½ hour a week, supplementary $75.
Three- or 6-semester-hour courses: individual lessons of 1 hour a week, supnentary fee, $100.
upplementary fees for applied music courses are nonrefundable after the first e weeks of the fall and spring semesters. Supplementary fees are different for rses offered during the summer sessions. Consult the department of music for ils.
he supplementary fee is waived for graduate degree candidates in music and full-e undergraduate music majors.

t Group

Required practice: 3 hours a week for 1-semester-hour courses and 6 hours a week 3-semester-hour courses. In addition, 3-semester-hour courses include assigned rkshops in theory and performance.

11 **Piano** (1)	Staff
12 **Piano** (3)	Staff
13 **Voice** (1)	Prussing, J. White, Dash
14 **Voice** (3)	Prussing, J. White, Dash
15 **Organ** (1)	Scribner, McNabb, Dobry
16 **Organ** (3)	Scribner, McNabb, Dobry
17 **Violin** (1)	Steiner, Parnas
18 **Violin** (3)	Steiner, Parnas
19 **Classical Guitar** (1)	Norris, Raffaelle, Ferruzza
20 **Classical Guitar** (3)	Norris, Raffaelle, Ferruzza
21 **Viola** (1)	Parnas
22 **Viola** (3)	Parnas
23 **Cello** (1)	Martin, Jarvinen
24 **Cello** (3)	Martin, Jarvinen
25 **Bass** (1)	Irvine
26 **Bass** (3)	Irvine
27 **Flute** (1)	Perazzoli, Fuhrman
28 **Flute** (3)	Perazzoli, Fuhrman
29 **Recorder** (1)	Kraft, Lipnick
30 **Recorder** (3)	Kraft, Lipnick
31 **Oboe** (1)	R. White
32 **Oboe** (3)	R. White

33 **Clarinet** (1) Wright
34 **Clarinet** (3) Wright

35 **Saxophone** (1) Wright
36 **Saxophone** (3) Wright

37 **Bassoon** (1) Lipnick, Maciejewicz
38 **Bassoon** (3) Lipnick, Maciejewicz

39 **French Horn** (1) Arsers, Ramsay
40 **French Horn** (3) Arsers, Ramsay

41 **Trumpet** (1) Recker
42 **Trumpet** (3) Recker

43 **Trombone** (1) Kraft
44 **Trombone** (3) Kraft

45 **Percussion** (1) Wardlow
46 **Percussion** (3) Wardlow

47 **Harp** (1) Staff
48 **Harp** (3) Staff

49 **Tuba** (1) Staff
50 **Tuba** (3) Staff

51 **Orchestra** (1) Steiner
Preparation and performance of orchestral literature. Prerequisite: audition before Director.

52 **Instrumental Ensemble** (2) Steiner
Chamber ensemble groups in addition to orchestra participation.

53 **Chorus** (1) Prussing
Preparation and performance of choral literature. Prerequisite: audition before Director.

54 **Chamber Choir** (2) Prussing
Small vocal groups in addition to chorus participation.

55 **Band** (1) Staff
Concert band, stage band and brass ensemble.

Second Group

Departmental prerequisite: Audition to meet departmental requirements.
Required practice: 6 hours a week for 1-semester-hour courses and 12 hours a week for 3-semester-hour courses. In addition, 3-semester-hour courses include master performance classes and recital preparation.

111 **Piano** (1) Staff
112 **Piano** (3) Staff

113 **Voice** (1) J. White, Davis
114 **Voice** (3) J. White, Davis

115 **Organ** (1) Scribner, McNabb, Dobry
116 **Organ** (3) Scribner, McNabb, Dobry

117 **Orchestral Instrument** (1) Staff
118 **Orchestral Instrument** (3) Staff

119 **Classical Guitar** (1) Staff
120 **Classical Guitar** (3) Staff

Group

quired practice: 12 hours a week for 3-semester-hour courses and 15 hours a for 6-semester-hour courses. In addition, 6-semester-hour courses include super- ensemble preparation and required concert solo performances.

211 **Piano** (3)
212 **Piano** (6)

213 **Voice** (3)
214 **Voice** (6)

215 **Organ** (3)
216 **Organ** (6)

217 **Orchestral Instrument** (3)
218 **Orchestral Instrument** (6)

ology

ssors F.N. Miller (*Acting Chairman*)
ciate Professors B.C. Zook (*Comparative*), Y. Al-Doory

rams of study leading to the degree of *Associate in Science (Medical Labora- T[illegible]nique)* is described in the *School of Medicine and Health Sciences Catalogue*. *ster of Science in the field of Anatomic Pathology*.—Prerequisite: a bachelor's e from an accredited college or university. The undergraduate program should cluded the following: (1) Biology—8 semester hours, including 4 hours of ory (this may be either in general biology or zoology but may not include redit courses in botany). (2) Chemistry—8 semester hours of general chemistry, including 4 semester hours of laboratory, and 6 semester hours nic chemistry, including laboratory. (3) Physics—8 semester hours, including two hours of laboratory. Courses in embryology, microbiology, histology, and mathematics are also useful.

ted the general requirements, pages 95–102. The program of study consists mester hours of graduate work and which consist of the following: Anat 202, 204, 205, Path 203-4, 205, 210, 215, 277, and 281.

ter of Science in the field of Mycology.—Prerequisite: a bachelor's degree with in biology, botany, chemistry or zoology from this University, or an equiva- gree. The undergraduate program should have included the following courses or equivalent: BiSc 11-12 *Introductory Biology for Science Majors* (4–4), Chem *General Chemistry* (4–4), 151-52 *Organic Chemistry* (3–3), 153–54 *Organic Laboratory* (1–1).

Doctor of Philosophy in the field of Pathology.—Prerequisite: one of the following degrees from a recognized professional school: Doctor of Medicine (M.D.), Doctor of Veterinary Medicine (D.V.M.), or Doctor of Dentistry (D.D.S.). In exceptional cases, applicants with other backgrounds in the life sciences may be accepted.

Required: the general requirements, pages 95–97, 102–104, including 48 semester hours of approved graduate course work and a minimum of 24 semester hours of dissertation research. One year of experience in pathology at the University Hospital, equivalent to Path 283, may be counted for a maximum of 24 semester hours of graduate course work. Other experience must satisfy the eligibility requirements of the appropriate national certifying body, i.e., the American Board of Pathology in the case of the M.D., the American Board of Veterinary Pathology in the case of the D.V.M., and the American Board of Oral Pathology in the case of the D.D.S.

Research fields: comparative pathology, human pathology, ophthalmic pathology, and veterinary pathology.

Staff

203–4 **Pathology** (4–4)

General introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies. Limited enrollment. Prerequisite to Path 203: Anat 202, 203, 204, 205; or equivalent. Prerequisite to Path 204: Path 203. (Academic year)

Zoos

*205 **Comparative Pathology I** (3)

An introduction to the study of disease in vertebrates, comparison with disease in man. Mechanisms by which various agents provoke illness; body defensive reactions. Illustration of common diseases of various species, including material from captive wild animals. Recommended courses in anatomy, histology, and physiology. (Fall)

Zoos

†210 **Comparative Pathology Laboratory** (2)

Special assignments for discussion and study, including study of common diseases of captive wild animals. Path. Lab., Nat'l. Zoological Park. (Fall)

Ke

†215 **Perinatal Pathology Laboratory** (2)

Special assignments for dissection and study. (Fall)

Al-Doo

220 **Medical Mycology** (2 or 4)

Study of pathogenic fungi, mycotic diseases and their clinical aspects, emphasis on handling of specimens, diagnosis, and identification of etiologic agents. Laboratory fee, $15. (Fall)

Zoo

†266 **Comparative Pathology II** (1)

Participation in an autopsy service involving wild animals in captivity and comparison of diseases in various animal species with those in man. Limited to 4 students. Path. Lab., Nat'l. Zoological Park. (Spring)

Al-Do

272–73 **Seminars in Mycology** (1–1)

Conferences and discussions on current topics and latest developments in medical mycology. May be repeated for credit. (Academic year)

* An interdepartmental course offered by the departments of pathology and biological sciences.
† Open to limited number of graduate students with permission.

275 **Research in Mycology** (2 to 4) Al-Doory

Participation in experimental studies in mycotic diseases. Research in laboratory or in community medicine on topics related to mycology. May be repeated for credit. (Fall and spring)

*277 **Anatomic Pathology Clerkship I** (arr.) Staff

A practical course in gross human anatomy and pathology. Prerequisite: Anat 201 or equivalent. Students may spend up to 24 weeks full-time on the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week period. Univ. and V.A. hosps. (Spring)

*281 **Anatomic Pathology Clerkship II** (arr.) Staff

A practical course in gross and microscopic human pathology. Prerequisite: Path 203–4 or equivalent. Students spend up to 24 weeks full-time, or the equivalent part-time, on the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week full-time period. Univ. and V.A. hosps. (Spring)

*283 **Anatomic Pathology Clerkship III** (arr.) Staff

Necropsy and surgical pathology service. Prerequisite: Path 203–4 or equivalent. Five semester hours of credit for each 4-week period. Students may receive up to 30 semester hours of credit for 6 months full-time. (Fall or spring)

*295 **Comparative Pathology III** (arr.) Zook

Participation in veterinary pathology service, including wild and domestic animals. Prerequisite: Path 203–4 or equivalent, Path 283. Five semester hours of credit for each 4-week period. Students may receive up to 30 semester hours of credit for 6 months full-time. Path. Lab., Nat'l. Zoological Park, and Armed Forces Inst. of Path. (Fall or spring)

300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

rmacology

fessors H.G. Mandel (*Chairman*), V.H. Cohn, P. Mazel, E.B. Truitt, Jr. *Research*), J.A. Straw
ciate Professors P. Klubes, F.B. Abramson
stant Professors G.S. Edwards, H.C. Harder, J.W. Dailey

limited number of graduate students, with permission.

Master of Science in the field of Pharmacology.—**Prerequisite: a Bachelor of Arts** or Bachelor of Science degree. The undergraduate program must have included the following courses, or equivalent: BiSc 11–12, Phys 1, 2; Chem 11–12, 22, 151–52, 153–54. One year of calculus and a course in physical chemistry are normally recommended but may be taken during the work toward the master's degree.

Required: the general requirements, pages 95–102, including Bioc 221–22, Phar 201; Phar 203, 205–6, 299–300.

Doctor of Philosophy in the field of Pharmacology.—**Required: the general requirements pages 95–97, 102–104.**

Research fields: biochemical pharmacology, cancer chemotherapy, carcinogenesis, developmental pharmacology, endocrine pharmacology, molecular pharmacology, neuropharmacology, pharmacology of drug abuse and physiological disposition of drugs.

114 **Drug and the Consumer** (3) Cohn and Staff

General concepts of drug action in the body. Action mechanism of some specific prescription and nonprescription drugs, including contraceptives, tranquilizers and sleep-inducing drugs; hayfever, headache and cold remedies; analgesics; antibiotics; vitamins. Issues related to development and marketing of drugs, drug safety, drug advertising, generic versus trade name drugs, drug use in sports, drug use during pregnancy, smoking and health. No science prerequisites required. Limited enrollment. (Fall)

115 **Drug Abuse Education** (3) Cohn and Staff

Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems, legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana and other hallucinogenic and psychedelic drugs. (Fall and spring)

203 **Fundamental Principles of Pharmacology** (2) Cohn and Staff

Basic principles of pharmacology, including drug receptor interactions, structure activity relationship, pharmacokinetics, membrane phenomena, cellular control mechanisms, drug toxicity. (Fall)

205–6 **Pharmacology** (4–4) Klubes and Staff

Lectures, laboratory, conferences on interaction of drugs and biological systems as a basis of rational therapy of disease. Prerequisite: Phar 201, biochemistry and physiology, or approval of department. Prerequisite for Phar 206: Phar 205. (Academic year)

215 **Adolescent Drug Abuse** (3 or 4) Cohn and Staff

Offered off campus through the College of General Studies. Primarily for teachers, counselors, and school administrators. Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse. (Fall and spring)

216 **Drug Abuse Education Techniques** (3) Cohn and Staff

Offered off campus through the College of General Studies. Primarily for teachers and counselors preparing to direct teacher and parent drug abuse education programs. Intensive review of current information

drug abuse, dynamics of group process, supervised practical experience. Prerequisite: Phar 215 and permission of instructor.

252 **Seminar: Clinical Pharmacology** (2) Staff

Principles of experimental design for the evaluation of drug efficacy and safety in man. Problems in therapeutics; emphasis on drugs used in treatment of cardiovascular and infectious diseases. Enrollment limited. (Spring, even years)

254 **Frontiers in Pharmacology** (1) Mazel and Staff

Recent advances and fields of research in pharmacology. Presentations by laboratory scientists from neighboring institutions. (Spring)

256 **Molecular Pharmacology** (2 or 3) Hahn

Current theory on action of drugs, especially chemotherapeutic agents, at molecular level. Effect of drugs on biosynthetic processes of the cell with respect to DNA, messenger RNA, transfer RNA, ribosomes, protein, cell wall, and intermediary metabolites. Factors which alter action of drugs, such as drug interactions and resistance. (Spring)

258 **Cancer Chemotherapy** (1) Mandel and Staff

Mechanisms by which drugs inhibit the growth of tumor cells. (Spring, even years)

259 **Developmental Pharmacology** (1) Staff

Lectures, seminars, conferences. Teratogenic actions of drugs; pharmacological principles which apply during prenatal and perinatal development. (Spring, even years)

260 **Endocrine Pharmacology** (1) Hertz and Staff

Lectures and seminars on recent advances in the pharmacology and mechanisms of action of various hormones. (Spring, odd years)

267 **Pharmacological Research** (arr.) Staff

Research with staff members. May be repeated once for credit toward a Master of Science degree. (Fall and spring)

269 **Pharmacology Seminar** (1) Mazel and Staff

Recent advances in pharmacology. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

272 **Physiological Disposition of Drugs** (arr.) Cohn

(*Formerly three credits*)

Fate of drugs in biological tissue. Absorption, distribution, chemical alteration, excretion of drugs; physical, chemical, and biological factors affecting these processes. Prerequisite: Phar 205–6 or equivalent. (Spring, even years)

-76 **Advanced Topics in Pharmacology I-II** (1–1) Klubes and Staff

Lectures and seminars on advances in mechanisms of drug action, pharmacology of new drugs, theoretical aspects of pharmacology, laboratory techniques. (Academic year 1977–78 and alternate years)

-78 **Advanced Topics in Pharmacology III-IV** (1–1) Klubes and Staff

Continuation of Phar 275–76. (Academic year 1976–77 and alternate years)

279 **Special Topics in Pharmacology** (arr.) Staff
Selected aspects of drug action. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

281 **Physiological Techniques in Pharmacology—Lecture** (2) Mazel, Straw
Physiological techniques for obtaining information on mechanism and site of action of pharmacological agents. Phar 281 may be taken without 282. Prerequisite: Phar 205–6 or equivalent. (Spring, even years)

282 **Physiological Techniques in Pharmacology—Laboratory** (2) Mazel, Straw
Accompanies Phar 281. Prerequisite: Phar 205 6 or equivalent. Prerequisite or concurrent registration: Phar 281. (Spring, even years)

283 **Biochemical Techniques in Pharmacology** (arr.) Edwards
Lecture and laboratory. Theory and practice of modern biochemical techniques applicable to study of metabolic fate and mechanism of action of drugs. Prerequisite: Phar 205–6 or equivalent. (Fall or spring)

295 **Reading and Research** (arr.) Staff
Independent study for students preparing for the Master of Science degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Philosophy

Professors T.Z. Lavine (*Chairman*), R.H. Schlagel
Associate Professors C.H. Pfuntner, W.B. Griffith, R.S. French
Assistant Professor R.P. Churchill

Bachelor of Arts with a major in Philosophy (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 102–104. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Required courses in related areas—6 semester hours of literature courses selected from Chinese, classics, English, French, German, Italian, Slavic or Spanish (Clas 71, 72, or Engl 191–92 recommended); 6 hours selected from art history, music history or religion; 6 hours in history (Hist 39–40 recommended).

Required courses in the major—Phil 111, 112, 113; 9 semester hours selected Phil 121, 131, 151, 152, 198; 6 semester hours selected from Phil 172, 192, lus 6 additional semester hours of second-group philosophy courses.

students expecting to continue in graduate school, it is recommended that nclude in their program of study 12 semester hours of introductory French, n or Greek language courses.

ter of Arts in the field of Philosophy.—Prerequisite: a bachelor's degree with lergraduate major in philosophy at this University, or an equivalent degree. ndergraduate program should have included the following courses or their lent: Phil 111, 112, 113, 121, 131, and 152.

uired: the general requirements, pages 95–102. The program of study consists ninimum of 30 semester hours of second- and third-group courses with or t a thesis. A Master's Comprehensive Examination is required in two areas osophy: the history of philosophy; problems of philosophy and contemporary phy. Candidates must pass a reading knowledge examination in French, Ger- r Greek.

ter of Arts in Special Studies with an area of concentration in Philosophy and Policy.—An interdisciplinary program which brings the normative, historical, nalytical-logical skills of philosophical inquiry to bear upon contemporary ns of social policy. Prerequisite: a bachelor's degree from an accredited col- r university. Students are expected to have completed the prerequisites to le courses.

uired: the general requirements, pages 95–102. The program of study consists semester hours with or without a thesis, including a plurality of approved s in the arts and sciences with no more than one-third from any one de- nt. Phil 195, 198, 231, and 272 are required. Courses may also be selected he School of Education, the School of Government and Business Administra- nd the National Law Center. All candidates are required to pass a Master's ehensive Examination. Prospective candidates should consult Professor ck French, director of the program, regarding specific requirements and the on of courses outside the department of philosophy.

T GROUP

50 Introduction to Philosophy (3) Staff

Readings from major philosophers and study of philosophic positions from Plato to the present. (Fall and spring)

71 Philosophy and Literature (3) Lavine

Philosophical foundations of psychoanalytical psychiatry, existentialism, and Marxism and their expression in literature, e.g., in the works of Mann, Kafka, Camus, Sartre, Hesse, Gide, and Koestler. (Spring)

ND GROUP

101 Logic, Scientific Inference, and Legal Argument (3) Griffith

Analysis of some main patterns of argument, including deductive, scientific and legal; emphasis on concrete examples.

111 History of Ancient Philosophy (3) Pfuntner

History of Western philosophy from early Greece to the early Middle Ages. (Fall)

112 History of Modern Philosophy (3) Churchill

History of Western philosophy of the 17th and 18th centuries (Descartes to Kant). (Spring)

113 **19th Century Philosophy** (3) Lavine

European philosophy from Kant to German Romanticism, Fichte, Hegel, Kierkegaard, Schopenhauer, and Nietzsche. (Fall)

121 **Introduction to Symbolic Logic** (3) Griffith

Systematic study of the principles of valid inference with attention to the development of skill in logical analysis and evaluation of arguments, and to the elementary theory of formal systems. (Fall)

127 **Theories of History** (3) Lavine

Major philosophies of history: Judeo-Christian, linear progress, historicism, Hegelian-Marxian dialectic, cyclical (Vico, Spengler, Toynbee) and social-scientific (Comte, Weber). Contemporary problems of historical knowledge. (Fall)

131 **Ethics** (3) Griffith

Main types of ethical theory: egoistic, utilitarian, self-realization, [illegible] science, existentialism. Applications to contemporary problems. (Spring)

132 **Social Philosophy** (3) Lavine, Churchill

Social philosophies from Locke to contemporary theorists. (Spring)

142 **Philosophy of Law** (3) Churchill

Systematic examination of fundamental concepts of law and jurisprudence, special emphasis on the relationship between law and morality.

151 **Myth, Science and the Modern Mind** (3) Schlagel

Comparison of the mythical and scientific outlook; emphasis on the development and nature of scientific concepts, methodology, and explanation from Copernicus to Einstein. (Fall)

152 **Knowledge, Truth and Reality** (3) Schlagel

Inquiry into the basis and structure of knowledge, the problem of perception and independent reality, and the meaning and criteria of truth. (Spring)

162 **Aesthetics** (3) Pfuntner

Nature of aesthetic experience, problems of appreciation and criticism in the arts, and theories of artistic creation. Emphasis on contemporary arts and criticism. (Spring)

163 **Philosophy and the Film** (3) Pfuntner

Examination of aesthetic theories in relation to the film as most familiar and powerful of 20th century art forms. Readings in aesthetic theory and film criticism. Viewing and critique of about eight films.

172 **American Philosophy** (3) Pfuntner

Philosophies of Peirce, Royce, James, Dewey, and Santayana as representatives of American thought. (Fall) Sm

182 **Philosophical Foundations of Psychology** (3)

The philosophical significance of psychology as a modern science focusing on the conflicts between (1) gestalt and classical psychology and phenomenological and behavioristic psychology.

* An interdepartmental course offered by the departments of philosophy and history

192 **Contemporary Philosophy: Analytical** (3) Schlagel

The two dominant movements of recent Anglo-American philosophy, logical positivism and British ordinary language philosophy, as represented by Russell, G. E. Moore, Wittgenstein, Ryle, Ayer, etc. (Fall)

193 **Contemporary Philosophy: Phenomenological** (3) Staff

The phenomenological movement, including its development into German and French existentialism, and its more recent phases. (Fall)

195 **Man and Nature in Public Policy** (3) French

Relation of philosophical conceptions of man and nature to national policies of growth and development in selected periods of American history. (Fall)

198 **Philosophy of the Social Sciences** (3) Lavine

Philosophic issues relating to theory, methodology, and application of the social sciences. Analysis of one major contemporary social scientific project. (Spring)

IRD GROUP

201–2 **Readings and Research** (3–3) Staff

Advanced readings and reports. Investigation of special problems. (Academic year)

216 **Seminar: Kant** (3) Schlagel

Critique of Pure Reason.

221 **Seminar: Logical Theory** (3) Griffith

Metatheory of deductive systems, modal logics; historical and philosophical import of recent developments.

231 **Ethics and Economic Policy: Justice and Equality** (3) Griffith

Economic policy viewed from the perspectives of ethical and economic theories with special focus upon the issue of income distribution in the United States. (Fall)

251 **Seminar: Philosophy of Science** (3) Schlagel

Intensive study of selected problems in the historical and theoretical foundations of science.

252 **Seminar: Epistemology** (3) Schlagel

Study of selected problems.

272 **Pragmatic Naturalism and American Social Policy** (3) Pfuntner

Examination of pragmatic naturalism as a criticism and reconstruction of American institutions. Evaluation of philosophical and theological alternatives to naturalism in the face of current technological and ecological problems. (Spring)

300 **Thesis Research** (3–3) Staff

(Fall and spring)

Physical Science

See "Chemistry."

Physics

Professors H.H. Hobbs (*Chairman*), J. Eisenstein, O. Bergmann, A.J. Zuchelli, F. Prats
Associate Professors W.C. Parke, N.K. Khatcheressian, D.R. Lehman
Assistant Professors M.F. Taragin, D.D. Thornton

Bachelor of Arts or Bachelor of Science with a major in Physics (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—Phys 3, 14, 15, 16; Chem 11–12; Math 31, 32, 33.
3. Required course in related area—Stat 97 or EE 51.
4. Required courses in the major—Phys 151, 161, 162, 163, 164, 165–66, 167, 168.

Master of Arts in the field of Physics.—Prerequisite: a bachelor's degree with a major in physics at this University, or an equivalent degree.

Required: the general requirements, pages 95–102, including Phys 231, 232, 233, 234, 235, 236, 299–300, plus *one* of the following: Phys 241, 243, 244, 245, or 251–52.

A reading knowledge of a foreign language, or the successful completion of Stat 197, with a grade of *A* or *B*, is required.

Doctor of Philosophy in the field of Physics.—Required: the general requirements, pages 95–97, 102–104, and the successful completion of one of the two following requirement options: (a) two foreign language reading examinations or (b) one foreign language reading examination and completion of Stat 197 with a grade of *A* or *B*.

Research fields: experimental solid state physics (electrical conductivity of solids, defects in crystals, magnetic properties of solids at low temperatures, magnetic resonance, Mossbauer effect, superconductivity), and theoretical physics (elementary particles, field theory, general relativity, magnetic and optical properties of solids, molecular structure, nuclear and photonuclear reactions).

Bachelor of Arts in Education with a teaching field in Physics.—Prerequisite: the education curriculum, pages 81–82.

Required: the physics option and the professional courses listed on pages 124–125.

Departmental Prerequisite: Phys 3, 14, 15, 16; two semesters of calculus or equivalent; and consent of a departmental adviser are prerequisite to all second-group courses.

Undergraduate departmental adviser: W. Parke, D. Lehman, N. Khatcheressian, M. Taragin.

Graduate departmental advisers: J. Eisenstein, O. Bergmann, A. J. Zuchelli, F. Prats, H. Hobbs.

ASTRONOMY

First Group

9–10 Introduction to Astronomy (3–3)

Lecture (2 hours), recitation (1 hour), laboratory (2 hours). Classes

through modern astronomy with introduction to basic principles underlying astronomical systems and observations. Primarily for nonscience majors. Laboratory fee, $11 a semester. (Academic year)

*11–12 **Introduction to Astronomy** (2–2) Hobbs

Same as Phys 9–10 without the laboratory. (Academic year)

21 **Modern Cosmology** (3) Staff

Nonmathematical treatment of cosmology and related subjects from astronomy and physics. Quasars, peculiar galaxies, pulsars, black holes, antimatter, etc. Prerequisite: Phys 10 or 12.

HYSICS

irst Group

1 **Foundations of Physics** (4) Parke

Development of conceptual principles underlying modern physical knowledge; basics of mechanics, heat and electromagnetism, including the classical concepts of energy, momentum, heat, temperature, entropy, electric and magnetic fields, optics. Prerequisite: two years of college preparatory mathematics or concurrent registration in Math 6. Laboratory fee, $18.

2 **Introduction to Modern Physics** (4) Zuchelli

Topics focusing upon present understanding of the physical universe and character of the atomic and subatomic worlds. Includes considerations of length and time in relativity theory, present understanding of gravitation, wave-particle duality, quantum theory, nuclei, subnuclear particles. Prerequisite: Phys 1 or equivalent. Laboratory fee, $18.

†3 **Foundations of Physics** (3) Parke

Same as Phys 1 without laboratory. (Fall and spring)

‡4 **Introduction to Modern Physics** (3) Zuchelli

Same as Phys 2 without laboratory. (Fall and spring)

6 **Energy and the Environment** (3) Lehman

Consideration of man's energy resources and their utilizational impact on the environment from a physical viewpoint. Topics include: man's energy resources, the demand for energy, the cost of energy, nuclear fission-radiation hazard to man, pollution due to energy sources, transportation of energy and waste, and energy converters. Prerequisite: high school algebra.

7 **Ideas of Physics—History and Analysis** (3) Bergmann

The development of atomic theory and corresponding views of space and time are discussed. Physical phenomena which were relevant to the evolution of the atomic theory are treated in historical perspective. Prerequisite: high school algebra.

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14 **Introductory Mechanics and Thermal Physics** (3) Khatcheressian

Physical principles of mechanics and thermal physics utilizing tools of calculus. Topics emphasized are vector calculus, equilibrium phenomena kinematics, Newton's Laws, conservation of mass, momentum and energy rotational motion, small vibrations, thermometry, macroscopic and microscopic properties of ideal gases, the laws of thermodynamics, thermal properties of solids and liquids. Prerequisite: Phys 3 or equivalent, Math 31. Laboratory fee, $18. (Spring)

15 **Elements of Electricity and Magnetism** (3) Staff

Introductory aspects of electromagnetic theory. Topics include static electric fields, Coulomb's Law, Gauss' Law, electrical potential, capacitance and dielectrics, electric current and resistance, Ampere's Law, Faraday's Law, Maxwell's equations in integral form, electromagnetic waves. Prerequisite: Phys 3 or equivalent, Math 31. Laboratory fee, $18. (Fall

16 **Introduction to Modern Physics** (3) Lehman

Elementary approach to the basic principles of quantum theory. Topics include wave-particle duality, the hydrogen atom, Pauli's exclusion principle, x-ray spectra, the atomic nucleus, radioactivity, nuclear reactions, statistical distribution laws, applications to molecular and solid state physics. Prerequisite: Phys 14, 15; Math 32. Laboratory fee, $15. (Spring)

27–28 **Physics in Medicine** (3–3) Parke

Principles of physics applied to biological systems and to medical instrumentation, including ultrasonics, circulation dynamics, bioenergetics, optics in medicine, applications of IR and UV radiation, medical transducers, particle radiation in medicine, models of the brain, molecular biophysics. Prerequisite: Phys 2 or equivalent. (Phys 28—spring)

Second Group

151 **Intermediate Research** (3) Taragin

(Formerly 151–52[3–3])

Independent advanced work to introduce students to research techniques and use of specialized instruments. Laboratory fee, $11 a semester (Academic year)

161 **Mechanics I** (3) Prat

Mechanics of mass points and rigid bodies. Newton's laws, conservation laws, Euler's equations, inertia tensor, small vibrations, and elements of Lagrange's and Hamilton's equations.

162 **Mechanics II** (3) Zuchelli, Khatcheressian

Basic aspect of continua, including elasticity and fluid dynamics, strain tensor, stress tensor, equations of equilibrium, elastic waves, ideal and viscous fluids.

163 **Physical and Quantum Optics** (3) Eisenstein, Hobbs

Oscillations and waves, energy and momentum of the electromagnetic field, interference, diffraction, geometrical optics, optics of crystals and other media, dispersion.

164 **Thermodynamics** (3) Khatcheressian, Thornton

Principles of equilibrium thermodynamics, reversible processes, thermodynamic potentials, stability and phase changes, applications.

165–66 **Electromagnetic Theory** (3–3) Prats, Taragin

Development of Maxwell's field equations using vector and tensor calculus, electrostatics, stationary and nonstationary phenomena, basic circuit theory, electromagnetic waves and radiation.

167 **Principles of Quantum Physics** (3) Bergmann, Zuchelli

Development of logical structure and experimental bases for modern quantum mechanics. Simple examples worked out to clarify the structure; primary emphasis on conceptual framework and its mathematical realization; careful consideration of the laboratory results to which the theory is a response.

168 **Applied Quantum Physics** (3) Zuchelli, Parke

Explicit applications of principles of quantum mechanics to a variety of problems in atomic, molecular and nuclear physics. Quantum statistical mechanics developed with applications in solid state. Emphasis on explicit evaluation of solutions and the techniques required. Prerequisite: Physics 167 or equivalent.

170 **Elementary Solid State Physics** (3) Thornton, Khatcheressian

Structure of solids, lattices and lattice defects, deformation, vibrational and electronic contribution to specific heats, binding, energies electronic states in metals and semiconductors, magnetic properties of solids. Elementary methods required such as quantum mechanics and normal mode expansions are developed as needed.

175 **Nuclear Physics** (3) Lehman, Prats

Introduction to application of quantum physics in the description of nuclei and their interactions. Properties of nuclei, nuclear models, nuclear forces, and nuclear reactions are considered. Specific topics include the deuteron, n-p scattering, the optical model, the shell model, the liquid-drop model, beta-decay, fission, and fusion. Prerequisite: Physics 167 or permission instructor.

...ird Group

...ent of a departmental graduate adviser is required for admission to all third-...p courses in Physics.

231 **Electromagnetic Theory: Macroscopic Effects** (3) Eisenstein

Detailed consideration of classical electromagnetic field theory in vacuum and in electrically and magnetically active media. Boundary value problems, multipole expansions, induced polarizations, time-dependent fields, frame dependence of the fields, gauge transformations, radiation fields.

232 **Advanced Mechanics** (3) Zuchelli

Analytic methods of mechanics as a basis for modern theory: variational principles, Lagrange's equations, Hamiltonian formulation, canonical transformations, classical perturbation theory.

233–34 **Quantum Mechanics** (3–3) Prats, Thornton

General aspects of quantum mechanics with emphasis upon the developmental principles involved. Operators, representations and transformation theory. Schrödinger and Heisenberg pictures, angular momentum, perturbation theory, scattering theory. (Academic year)

235 **Special Relativity** (3) Bergmann

Application of relativistic concepts to the basic fields of physics: space and time, tensors and covariant mechanics of point particles, covariant form of electromagnetism, relativistic variational principles, relativistic quantum equations.

236 **Electromagnetic Theory: Electrodynamics and Radiative Effects** (3) Bergmann, Eisenstein

Analysis of problems involved in obtaining the motion of charges in given electromagnetic fields and radiation from such charges. Covariant methods developed and used where suitable. Specific topics include radiation by moving charges, spectral decomposition and integrated flux, angular distribution of radiation, radiation reaction and anomalies.

241 **Statistical Mechanics** (3) Lehman, Bergmann

Study of classical and quantum equilibrium statistical mechanics. Kinetic theory and transport phenomena reviewed prior to examining principles of statistical mechanics. Among topics considered: distribution functions, H-theorems, partition functions, Gibb's paradox, canonical ensemble, grand canonical ensemble, ideal gases, interacting gases, cluster expansion, virial expansion, and density matrices.

242 **Atomic and Molecular Structure** (3) Bergmann

Structure of atoms and molecules, energy levels, binding energy, optical activity. Hartree and Hartree-Fock equations spin-effects, rotational and vibrational effects, para-magnetic resonance, chemical binding.

243 **Solid State Physics: Structure and Binding** (3) Khatcheressian, Hobbs, Taragin

Atomic structure of solids and analysis of the binding of crystals. Crystalline forms and symmetries, atomic vibrations and specific heats, sound and optical propagation, crystalline defects.

244 **Solid State Physics: Electronic Processes in Metals** (3) Khatcheressian, Eisenstein, Thornton

Phenomena in metals and semi-conductors determined by the electronic states allowed: binding, specific heats, magnetic properties, transport phenomena. Independent particle approximation and many-body aspects are discussed.

245 **Quantum Electrodynamics: Theory and Applications** (3) Zuchel

A presentation of the lower order effects depending upon the quantal nature of the electromagnetic field: Hamiltonian formulation and field quantization, perturbation calculations, Compton effect, photoelectric effect, electron-electron scattering, pair creation and annihilation, indices of refraction, divergence difficulties.

246 **Quantum Field Theory** (3) Bergmann

Covariant presentation of general theory of quantized fields, Boson and Fermion fields, theory of S-matrix, dispersion relations, and renormalization program.

247 **Nuclear Theory** (3) Prats, Lehman

Nuclear interactions, nuclear models, theory of nuclear reactions, pion physics and weak interactions.

248 **Elementary Particles** (3) Parke

Experimental properties and present theoretical understanding of subnuclear particles; applied S-matrix formalism; symmetry principles; unified models, and theories of weak, electromagnetic, and strong interactions.

249 **Statistical Processes** (3) Zuchelli

Analysis of problems involved in understanding and predicting the approach to equilibrium of a complex system within the classical context, as exemplified by rare or dense gases, ionized gases, or plasmas. Specific topics include: Liouville equation, ergodic theory, Boltzmann equation, Boltzmann-Vlasov equation, Chapman-Enskog theory, Bogoliubov time scales, Prigogine type formalism, convergence questions.

250 **Selected Topics in Modern Physics** (3) Staff

Possible topics include nuclear three-body problem; group theory and symmetry principles in physics; differential manifolds applied to physics; electric states and superconductivity; gauge field theories; dispersion relations and unitarity in scattering theory. May be repeated for credit with permission of graduate adviser. (Fall and spring)

251–52 **Laboratory** (3–3) Staff

Individual work on special topics. Laboratory fee, $15 a semester. (Academic year)

254 **General Theory of Relativity** (3) Bergmann

Physical principles and mathematical methods underlying Einstein's field equation, geodesic equations of motion, checks of the theory, action principle, conservation laws, perturbation theory, gravitational radiation theory, relativistic cosmology.

291 **Seminar** (1) Staff

Lectures on special problems in physics. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

Fourth Group

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated once for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit (Fall and spring)

Physiology

Professors C.S. Tidball, R.A. Kenney (*Chairman*), M.E. Tidball, M.M. Cassidy

Associate Professors M.J. Jackson, R.A. Lavine, D.W. Watkins

Master of Science in the field of Physiology.—Prerequisite: a bachelor's degree. No major is specified, but the undergraduate program must have included the following courses or equivalent: BiSc 11–12; Chem 11–12, 22, 151–52, 153–54; Math 31; Phys 1, 2.

Required: the general requirements, pages 95–102. In addition to the thesis, the 30 hours of required work should include Phyl 201, 221, 298, and at least 3 semester hours of research (Phyl 295).

Doctor of Philosophy in the field of Physiology.—Required: the general requirements, pages 95–97, 102–104. The program of study includes a major field in physiology, a subfield (see below) in physiology and a minor field outside of physiology leading to the Cumulative Examination. The 48 semester hours of required course work leading to the Cumulative Examination should include Bioc 221–22; Phyl 201, 221, 298, 396, 397; and a minimum of 8 semester hours each in two areas outside of Physiology in addition to the minor field.

Research fields and areas of study: applied physiology, cardiovascular physiology, cellular physiology, endocrine physiology, gastrointestinal physiology, neurophysiology, renal physiology and respiratory physiology.

Departmental prerequisite: Phyl 201 or equivalent is prerequisite to all courses in physiology numbered above 201

191 **Selected Topics in Human Structure and Function** (3) Kenney

Lecture (2 hours), laboratory (1 hour). Structural and functional bases of physiology. A required course for graduate students who have not had Anat 201 or equivalent. An undergraduate course, students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: BiSc 11–12 or equivalent and consent of instructor. Open to Columbian College of Arts and Sciences students with the approval of the student's major adviser. (Fall)

201 **Physiology** (8) Staff

Lecture (8 hours), laboratory (2 hours), conference (1 hour). Cellular, organ system, and applied mammalian physiology. Prerequisite for graduate students: Anat 201 or Phyl 191, or equivalent; Bioc 201 or 221–22 (Bioc 222 may be taken concurrently); or consent of chairman of department. Open to Consortium students only with permission of department chairman. (Spring)

212 **Neurobiology** (3) (Same as Anat 212) Staff

An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstrations, and laboratory. Laboratory fee, $25.

221 **Seminar** (1) Cassidy

Staff and student presentations from literature. Present work discussed, experimental design and scientific deduction evaluated. Topics to be announced. Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

223–24 **Biomedical Instrumentation** (4–4) Staff

Same as Bioc 225–26, ForS 281–82 and Micr 240–41. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification and quantification of materials of interest to biomedical and forensic scientists. Laboratory fee, $50 (Academic year)

251 **History of Medicine** (1) E. Tidball

Survey of the great contributors to physiology and medicine in the context of the times in which they lived and worked. (Fall)

252 **Physiological Basis of Sexuality** (2) C. Tidball, E. Tidball

Conference and discussion on topics including communication, psychosexual development, physiological responses, homosexuality, population control and family planning, fertility and sterility, etc. (Fall)

253 **Physiology of Fluid Balance and Hydrogen Ion Regulation** (2) Cassidy

Discussion on principles of fluid and acid-base balance and the application of these principles to scientific situations. (Fall)

261 **Gastrointestinal Physiology** (1 or 2) Jackson, Dobbins[3]

Weekly seminar; role of basic sciences in gastroenterology; intra- and extra-mural speakers. An approved paper required for 2 semester hours of credit. May be repeated for credit. (Fall and spring)

262 **Topics in Cardiovascular Physiology** (2) Kenney

Survey, at an advanced level, of aspects of cardiovascular physiology especially as interrelated with the respiratory and renal systems. (Fall)

265 **Review of Endocrinology** (1) Jackson

Review of basic endocrinology. (Fall)

266 **Advanced Endocrinology** (2) Jackson

Review at advanced level of selected topics in endocrinology and metabolism. Concurrent registration in Phyl 265 required. (Fall)

267 **Renal Physiology** (2) Kenney

Lecture or conference 2 hours a week. Overview of renal physiology at advanced level.

[2] Interdisciplinary course offered by the departments of biochemistry, forensic sciences, microbiology, physiology

[3] Dobbins III is Professor of Medicine, School of Medicine and Health Sciences

268 **Computer Utilization in Physiology and Medicine** (2) C. Tidbal

Lecture 1 hour a week, practical experience at student's convenience. Orientation to digital and analog mini-computers. Programming in several languages. Experience with one or more computers. No previous computer experience necessary. (Fall)

269 **Topics in Neurophysiology and Psychophysiology** (2) Lavine

Selected topics in contemporary neurophysiology, including methods of data collection and analysis, control mechanisms involved in movement and behavior and sensory processing. Open to students in the School of Engineering and Applied Science with permission of instructor. (Fall)

295 **Research** (arr.) Staff

By special arrangement with individual Staff members. Approximately 4 clock hours in the laboratory for each semester hour of credit. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

298 **Comprehensive Physiology** (arr.) Staff

Guided review of selected areas of Physiology appropriate to the student's graduate program. This course satisfies the requirements for the Master's Comprehensive Examination, the Field Examination for doctoral students minoring in Physiology, and Part I of the Cumulative General Examination. Prerequisite or concurrent registration: Phyl 221. (Fall)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

396 **Advanced Reading and Research** (2) Staff

Limited to students preparing for the Doctor of Philosophy general examination. Tutorial literature survey of a subfield of Physiology and of pertinent areas of the candidate's minor field. This course satisfies the requirement for Part II of the Cumulative General Examination in Physiology. (Fall and spring)

397 **Development of Dissertation Problem** (2) Staff

Limited to students preparing for the Doctor of Philosophy general examination. Preparation for written and oral presentation of dissertation problems. This course satisfies the requirement for Part III of the Cumulative General Examination in Physiology. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Polish

See "Slavic Languages and Literatures."

litical Science

fessors R.E. Purcell, H.L. LeBlanc, B. Nimer, A. Gyorgy, H.C. Hinton, .M. Sapin, J.A. Morgan, Jr., B. Reich (*Chairman*), Y. Kim
ociate Professors C.F. Elliott, C.A. Linden, S.J. Wayne, J.M. Logsdon, H.R. Nau
unct Associate Professor D. Robinson
istant Professors R.E. Darcy, J.M. Starrels, S.W. Burks, R.L. Cole, D. Fischer E.R. Declercq (*Visiting*), G.C. MacKenzie, S. Shaffer
ociate Professorial Lecturer J.F.C. Hyde, Jr.
ructor C. McClintock

achelor of Arts with a major in Political Science (Departmental).—The follow- requirements must be fulfilled:

. The general requirements as stated on pages 77–78, 85–91.

. Prerequisite courses—PSc 4 and 6 or 5 and 6; Stat 51 or 53. (12 semester rs of introductory foreign language courses are recommended for students in- sted in political theory, comparative government, or international relations.)

. Required courses in related areas—18 semester hours of social studies other political science, including six hours of either economics or history.

. Required courses in the major—30 semester hours of second-group political nce courses which must include six semester hours from each of Groups A, B, C, D listed below. The six hours from Group A must include PSc 105 (which uld be taken no later than the second semester of the junior year); the six hours m Group B must include PSc 103 or 104 or 122 or 145; the six hours from up C must include PSc 111 or 112; the six hours from Group D must include c 171 or 172 or 181.

roup A: Political Theory and Methodology—PSc 105, 107, 117–18, 119–20, *Group B:* American Government and Politics—PSc 103, 104, 106, 108, , 122, 125, 126, 145, 146, 149, 150, 151, 167, 183–84, 185–86, 199. SPSc 154. *Group C:* Comparative and Foreign Government and Politics—PSc 101, 111, 115, 162, 163, 177, 180, 190, 191, 192, 193, 194; *Group D:* International tics, Law, and Organization—PSc 171, 172, 178, 179, 181, 189, 197.

A student majoring in political science may not credit more than 12 hours of e Service-Learning courses or internships with their associated seminars toward egree; no more than 6 hours of such courses may be credited toward the major. tudents in the 90-semester-hour degree program (see pages 87–88) must receive des of *A* in at least 18 semester hours of second-group political science courses. Political science majors may apply for graduation with Special Honors. In order e recommended by the department for Special Honors, students must fulfill the eral requirements (see pages 50–51) and must complete with distinction a project dependent study, as demonstrated in a written paper, in addition to the normal requirements of particular courses. A committee of the department will re- the paper and make the recommendation for Special Honors.

tudents who wish to undertake independent study for Special Honors should reg- with the secretary of the department *no later than the second week of each* ester, and then consult with a member of the department whose specialized inter- in the area of the proposed research project. Students registered for PSc PSc 155 may qualify for graduation with Special Honors by completing with on the work connected with their internship.

ster of Arts in the field of Political Science.—Prerequisite: a bachelor's degree major in political science from an accredited college or university (or an ivalent degree), with high scholastic standing.

Required: the general requirements, pages 95–102, including a reading knowledge of a modern foreign language or a specified level of knowledge in statistics. The choice of the foreign language, or of statistics in lieu of a language, must be made with the approval of the department. With the approval of the department, students may elect one of the following programs: (1) 24 semester hours of graduate course work plus a thesis (equivalent to six semester hours) and the satisfactory completion of a Master's Comprehensive Examination in three fields of political science (selected from the areas of study listed below under the Ph.D. program); or (2) 33 semester hours of graduate course work, including two research seminars (equivalent to six semester hours) without a thesis and the satisfactory completion of a Master's Comprehensive Examination in four fields of political science (selected from the areas of study listed below under the Ph.D. program).

Students in either the 30- or 33-semester-hour program must include in their program of study PSc 201 during the first semester of graduate study unless by a waiver examination they can demonstrate equivalent knowledge of the subject matter of the course.

Doctor of Philosophy in the field of Political Science.—Entering students must have a knowledge of statistics equivalent to the satisfactory completion of an introductory course in statistics. An otherwise qualified student should satisfy this requirement as early as possible.

Required: the general requirements, pages 95–97, 102–104, including (1) a reading knowledge of two modern foreign languages, or a reading, writing, and speaking proficiency in one modern foreign language, or a reading knowledge of one modern foreign language and a specified level of knowledge in statistics, and (2) the satisfactory completion of examinations in a major and a minor field of study, which constitute the General Examination.

Each student must include in the program of study PSc 201, 202, and 207 unless by a waiver examination the student can demonstrate equivalent knowledge of the subject matter of the courses.

Major and Minor Fields of Study: Each student has a major and a minor field of study chosen from four principal *subject-matter* divisions of the discipline—theory and methodology, international relations, comparative and foreign politics, and American politics.

Subfields of Study: Each subject-matter division includes several subfields of study (see below) from which the student constructs a program in consultation with an adviser. A major field of study consists of *three* subfields; a minor field consists of *two* subfields.

Fields of Study: theory and methodology (analysis of Western political thought, analysis of Marxist and Marxist-Leninist thought, scope and methods of political science, quantitative political analysis); comparative and foreign politics (comparative political analysis, regional comparative politics, domestic politics of specified major political system); international relations (international politics, international law, regional international relations, foreign relations of a specified major political system); American politics (American political process, national policymaking process, American constitutional law and judicial process and state, local and urban politics).

Doctor of Philosophy fields of study in International Relations combine work in economics, history and political science.

Departmental prerequisite: PSc 4 and 6 or 5 and 6 are prerequisite to all second-group courses in political science and service-learning political science.

ITICAL SCIENCE

t Group

4 Introduction to Political Science (3) — Darcy

Study of political behavior, including the role of politics in today's world, the sources of elite and mass political behavior, and the influence and nature of political institutions. Students who receive credit for PSc 4 cannot receive credit for PSc 5. (Fall)

5 Introduction to Political Science (3) — Gyorgy

Introduction to the study of comparative political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies. Students who receive credit for PSc 5 cannot receive credit for PSc 4. (Fall and spring)

6 Introduction to Political Science (3) — Wayne, Cole

Introduction to the study of the structure, powers, and processes of the American political system. (Fall and spring)

ond Group

101 Far East in the Modern World (3) — Michael

General character of Far Eastern societies and their response to the impact of America, Europe, and Russia; American policy in the Far East and the influence of world communism. (Fall)

103 State Politics (3) — Cole

Theory and practice of American federalism, factors influencing state policy choices, state responsiveness to urban problems. (Fall)

104 Urban Politics (3) — Burks, Cole, Declercq

Demographic trends and implications, local metropolitan political systems, issues in urban politics, strategies of political change. (Spring)

105 Scope and Methods of Political Science (3) — Kim, Darcy, Cole, Declercq, Shaffer

Nature of political inquiry, approaches to the study of politics and government, empirical methods of research. Prerequisite: Stat 51 or 53; or equivalent. (Fall and spring)

106 The Politics of Social Change (3) — Burks

Theories of revolution and change; protest in American politics; urban violence and political change; institutional innovation, reform, and responsiveness; realistic and unrealistic strategies of change. (Fall)

107 Issues in Modern Political Thought (3) — Linden

Issues of modern political thought as seen through major representative thinkers. Emphasis on conservative, liberal, and radical thought.

108 Science, Technology and Politics (3) — Logsdon

Examination of the multiple impacts of scientific and technological developments on the political system. Discussion of public policies for the support, use, and control of science and technology. (Fall)

111 **Comparative Government and Politics** (3) Kim, Gyorgy, Stambuk

Government and politics of the principal constitutional democracies of Western Europe. (Fall and spring)

*112 **Comparative Government and Politics** (3) Elliott, Gyorgy, Hinte

Government and politics of the communist nations; emphasis on the Soviet Union and the countries of Eastern Europe. (Fall and spring)

*115 **Government and Politics in Eastern Europe** (3) Gyorg

Study of the contemporary social and ethnic structures, governmental systems, and international position of the Eastern European states within the Soviet system.

117–18 **Political Theory: Major Issues of Western Political Thought** (3–3) Linden, Fische

PSc 117: foundations of Western political thought—Plato to Aquinas. PSc 118: philosophical roots of modern political order and disorder—Machiavelli to Rousseau. (Academic year)

119–20 **American Political Thought** (3–3) Staff

Introduction to political thought in the United States from colonial times to the present.

121–22 **U.S. Constitutional Law and Politics** (3–3) Morgan

PSc 121: separation of powers, federal-state relationships, economic regulation. PSc 122: political and civil rights. Prerequisite: junior status. (Academic year)

125 **Legislative Process** (3) MacKenzie

Study of Congress, including theories of representation, legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches. (Fall and spring)

126 **The American Presidency** (3) Wayne, Hyde

Examination of the politics of Presidential selection, the authority of the contemporary institution, the mechanisms and processes for formulating public policy, and the influences of personality on performance in office. (Fall)

145 **U.S. Political Parties and Politics** (3) LeBl

Party system and structure, role of ideology, voting behavior, campaigns and elections, devices for organizing the government. (Fall and spring)

146 **Public Opinion and Political Socialization** (3) Dav

Sources of mass political attitudes and behavior; voting and political campaigning. Prerequisite: PSc 105 or permission of instructor. (Spring)

* PSc 112 and 115 are related in their subject matter, and credit for only one may be applied toward a degree.

149 **Readings on the U.S. Congress** (3) Robinson

Readings and group discussions of major writings on the structure and processes of the U.S. Congress. Open only to students who are enrolled in PSc 150 or who have congressional work experience. Selection is by a Departmental committee. (Fall and spring)

150 **Internship in Politics** (3) Robinson

Study of the political process in action through assignment to a political or governmental office. Limited to selected juniors and seniors, with preference given to seniors majoring in Political Science. Seminar open to congressional workers. (Fall and spring)

151 **Public Administration and Public Policy-making** (3) Logsdon

Examination of the process by which the federal government selects and implements public policies. Particular attention to the role of bureaucracies in the policy-making process. Criteria for the evaluation of public policy. (Spring)

160 **Modern Communist Ideologies** (3) Elliott

Intensive study of modern communism: emphasis on its antecedents and possible evolution. Careers and ideas of leading figures: Marx, Lenin, Stalin, Khrushchev, and Mao. (Spring)

*162 **Government and Politics of China** (3) Hinton

Analysis of the government and politics of China, including the Chinese tradition, modern Chinese history, Marxism-Leninism, and Soviet influence.

163 **Soviet Foreign Policy** (3) Elliott

Relations with United States, Third World, China; international communism; instruments of foreign policy; interrelationships of domestic and foreign policies; ideology and foreign policy. (Fall)

167 **U.S. Foreign Policy** (3) Purcell

Constitutional and political factors that determine the formulation, execution, and substance of U.S. foreign policy. (Fall)

171 **International Politics** (3) Starrels, Shaffer

International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy. (Fall and spring)

172 **International Organizations** (3) Stambuk, Nau

Development and operations of the United Nations, regional organizations, and functional international organizations. (Fall and spring)

177 **Governments and Politics in Latin America** (3) McClintock

Political processes and institutions in Latin America; emphasis on Argentina, Brazil, Chile, and Mexico. (Fall)

178 **International Relations of Latin America** (3) McClintock

U.S.-Latin American relations, inter-American diplomacy and organization, foreign policies of selected states, the Cuban revolution. (Spring)

[illegible] and 194 are related in their subject matter, and credit for only one may be applied toward

179 **International Relations of the Middle East** (3) Reich
Analysis of the regional and international relations of the Middle East. (Spring, even years)

180 **Israeli Foreign Policy** (3) Reich
Examination of the institutions, processes, and issues of Israeli foreign policy.

181 **Public International Law and Organization** (3) Fischer
Survey of international law; emphasis on development and trends. (Fall and spring)

183–84 **Senior Seminar: Urban Affairs** (3–3) Burks
Readings and group discussions of major writings on urban political and policy-making processes. Primarily for senior Urban Affairs majors; others admitted by permission of instructor. (Academic year)

185–86 **Apprenticeship in Urban Affairs** (3–3) Burks
Study of urban political and policy making processes through assignment to an urban-related political or governmental office. Primarily for senior Urban Affairs majors; others admitted by permission of instructor. (Academic year)

189 **African International Politics** (3) Nimet
Analysis of interstate relations in Africa and of selected aspects of African relations with the outside world. Recommended but not required: PSc 190 or equivalent. (Spring)

190 **Politics of Middle and Southern Africa** (3) Nimet
Comparative analysis of the political systems of selected countries of non-Mediterranean Africa. (Fall)

191 **Governments and Politics of the Middle East** (3) Reich
Domestic and international politics of the eastern Arab states, Turkey, Iran, Israel. (Fall)

192 **Governments and Politics of North Africa** (3) Reich
Domestic and international politics of Algeria, Tunisia, Morocco, Libya, Egypt, Sudan; their relations with states of the Middle East. (Spring)

193 **Governments and Politics of South and Southeast Asia** (3) Hinton
Domestic and international politics of the major states in the area. (Spring)

*194 **Governments of China and Japan** (3) Michae
Institutions and processes of government in contemporary China and Japan, with some historical background. Attention to ideological forces. (Spring)

196 **Methods of Public Policy Analysis** (3) Staff
Models and case studies of public policy formation and changes, techniques of policy analysis and evaluation, normative implications of alternative policy-making frameworks.

* PSc 162 and 194 are related in their subject matter, and credit for only one may be applied toward a degree

197 **Proseminar: International Affairs** (3 or 6) Purcell, Reich, Storrs

Substantive problems of U.S. foreign policy. Readings, term papers, discussion.

198 **Proseminar: International Regionalism and World Politics** (3) Stambuk

Theory and practice of regional integration and cooperation with emphasis on political aspects of the European Common Market, U.S.-European relations and Atlantic Alliance. Prerequisite: PSc 171 or 172 or permission of instructor.

199 **American Government and Politics** (3) Staff

Reading and research on selected contemporary problems. Limited to juniors and seniors majoring in Political Science or Public Affairs. Admission by permission of instructor.

rd Group

rd-group political science courses are designed for graduate students who have ropriate second-group prerequisites.

201 **Scope and Methods of Political Science** (3) Wayne, Shaffer

Introduction to the discipline and the profession, analysis of the nature of political inquiry, discussion of conceptual approaches to the study of politics and government. (Fall)

202 **Modes of Political Inquiry** (3) Linden

Examination and comparison of some major modes of political thought. Analysis of discursive, systematic, philosophical, and scientific approaches. (Spring)

203 **State Politics** (3) Burks

Readings and discussions on developments in state politics research, changing roles in the federal structure, state political systems, governmental performance, policy innovation and change. (Fall)

204 **Urban Politics** (3) Burks

Readings and discussions on patterns and implications of urban growth, local and metropolitan political systems, policy formation and change, conflict management, political constraints on social reform. (Spring)

205 **Government, Science, and Technology** (3) Logsdon

Examination of the demands on national and international political systems resulting from the impact of scientific and technological developments and of the responses of governmental institutions and processes to these demands. (Fall)

206 **Science, Technology, and Public Affairs** (3) Logsdon

In-depth examination of selected domestic policy issues with significant scientific or technological aspects. Teams of students will prepare policy analyses on each issue discussed. (Spring)

207 **Empirical Political Analysis** (3) Darcy

Techniques of data gathering and analysis, the uses of data in political research. (Spring)

208 **Seminar: Science, Technology, and World Order** (3) Nau

Intensive reading, discussion, and research on the impact of science and technology on world order, in particular the claim that a new global politics is replacing traditional international or nation-state politics. (Spring)

210 **Advanced Topics in Empirical Political Analysis** (3) Cole

Advanced techniques of data collection and analysis; varying emphasis on such methods as causal modeling, analysis of variance, regression analysis, and simulation.

211–12 **Comparative Government and Politics** (3–3) Kim, McClintock

Problems of comparative political analysis; a comprehensive examination of the literature in comparative politics. (Academic year)

213 **Comparative Communist Systems I** (3) Petrov

Ideological foundations of communism; emergence of the Soviet system, development of the international communist movement to World War II, postwar formation of the Soviet bloc. (Fall)

*214 **Comparative Communist Systems II** (3) Hinton

Comparative analysis of major recent ideological trends and political institutions and behavior among ruling and nonruling Communist Parties. (Spring)

215–16 **Seminar: the Communist Camp in World Politics** (3–3) Staff

Significant issues of communism, particularly in the Soviet Union and Red China; concept and structure of "world socialist system"; intra-bloc relations with emphasis on the Sino-Soviet dispute.

217 **Readings in Political Theory** (3) Linden

Readings and discussions, principally on modern political and constitutional theory since the 17th and 18th centuries; emphasis on basic issues and schools of thought. (Fall)

219 **Seminar: Western European Politics** (3) Starrels

Comparative examination of major political system characteristics of France, England, and the two Germany's. Special attention devoted to political culture, socialization, recruitment, and communication. (Fall and spring)

221 **The United States Constitution and the Judicial Function** (3) Morgan

Lectures and group discussions on constitutional law and politics. (Fall)

224 **Readings in Socialism and Communism** (3) Elliott, Linden

Readings and discussions of works illuminating the evolution of pre- and post-Marxian socialism. (Fall)

227 **Seminar: Governments and Politics of Eastern Europe** (3) Gyorgy

Comparative study of Eastern European states: political, social, economic institutions; problems of regional integration and relations with outside powers. (Spring)

* An interdepartmental course offered by the departments of political science and history.

229 **Readings in Soviet Government and Politics** (3) Elliott, Linden

Readings in contemporary Soviet domestic government and politics. Prerequisite: 3 semester hours selected from Hist 146, PSc 194; or equivalent. (Fall)

*231 **Seminar: Sino-Soviet Relations** (3) Michael

Background, development, and status of conflict within the communist movement; emphasis on the role of Chinese communists. Prerequisite: 3 semester hours selected from Hist 187; PSc 101, 194; or equivalent. (Spring)

232 **Seminar: International Communications** (3) Staff

East-West perspectives. Theory and history of national patterns of international communications focusing on basic political and psychological aspects of communication between major communist and noncommunist powers. (Spring)

233 **Seminar: Soviet Government and Politics** (3) Elliott, Linden

Research seminar in selected problems of Soviet domestic government and politics. Emphasis: since Stalin. Prerequisite: PSc 229 or permission of instructor. (Spring)

235 **Interactive Effects: Theory and Analysis** (3) Darcy

Examination of logical structure of political and social theory and consequent problems of multivariate research design and analysis. Alternative theories and analytical techniques explored on selected data sets. Prerequisite: PSc 207 and permission of instructor.

236 **Research Seminar: Intergovernmental Relations** (3) Staff

Analysis of the fiscal, structural, social, and political aspects of the evolving federal system; emphasis on metropolitan government.

244 **Public Policy Analysis** (3) Staff

Reading and research on systematic methods of public policy analysis.

245 **The American Political Process** (3) LeBlanc

Lecture and discussion on the nature and functions of political parties, interest organizations, and other political groupings in the American political system. (Fall)

246 **American Policy-making Process** (3) Wayne, MacKenzie

Lecture and discussion on the structure and processes for formulating public policy at the national level. Emphasis on interaction between executive and legislative branches. (Spring)

253 **Seminar: Chinese Government and Politics** (3) Michael

Political institutions and concepts in late imperial times, during the revolution, under national government, and under communism. Emphasis on the communist period. (Fall)

254 **Colloquium: East Asia** (3) Michael

Interuniversity research colloquium of faculty members concerned with the study of China, Japan, and Korea. Advanced graduate students admitted with permission of faculty group. (Fall and spring)

* Interdepartmental course offered by the departments of political science and history

255 Colloquium: Russia and Eastern Europe (3) Gyorgy

Interuniversity research colloquium of faculty members concerned with the study of Russia and Eastern Europe. Advanced graduate students admitted with permission of faculty group. (Fall and spring)

256 Problems in Transnational and Comparative Politics of Western Europe (3) Stambuk

National and supranational political processes in Western Europe with emphasis on comparative analysis of interest aggregation and articulation, interbureaucratic relations and selected policy outcomes.

257–58 Seminar: Communism in Developing Countries (3–3) Staff

Examination of international communist policy for, and communist parties in the noncommunist world. (Academic year)

265–66 Chinese Communist Policy Processes (3–3) Hinton

Introduction to the literature and to graduate research in contemporary Chinese politics. PSc 265: readings and group discussion. PSc 266: research seminar. (Academic year)

267 Seminar: U.S. Foreign Policy (3) Purcell

Research and selected reading as the basis for an analysis of the foreign policy of the United States, with particular reference to the decision-making process and the execution of policy. (Fall)

268 Seminar: Comparative Foreign Policies (3) Staff

Research and selected reading as the basis for an analysis of the foreign policies of major powers, with particular reference to the decision-making process and the execution of policy. (Spring)

269 Seminar: Soviet Foreign Policy (3) Elliott

External policies and relations of the USSR; relations with other communist states, Western powers, and other countries. (Spring)

270 Political and Social Institutions of Eastern Europe (3) Gyorgy

Major political and social factors which have shaped the inter-war, World War II, and post-war evolution of Eastern Europe; emphasis on selected countries. (Fall)

271–72 Problems in International Organizations (3–3) Nau, Stambuk

PSc 271: analysis of the political dimension of international organizations; special reference to the United Nations. PSc 272: examination of the operational and administrative aspects of international organizations; special reference to regional and functional bodies. (Academic year)

273 Public Opinion and Foreign Policy (3) Purcell

Development, organization, and operation of international information programs by major world powers. U.S. public opinion influencing foreign policy formation and conduct. (Spring)

274 Principles and Problems of International Political Communication (3) Staff

Reading and discussion of public opinion/foreign policy relationships and operation of international political communication programs by major world powers as a tool of foreign policy. (Spring)

275 **Theories of International Politics** (3) Nimer, Shaffer

Critical examination of contemporary theories, both empirical and normative. (Fall)

276 **Topics in International Politics** (3) Nimer, Shaffer

Reading, research, and discussion of selected structural and procedural aspects of international political relations. (Spring)

277–78 **Seminar: Latin American Politics** (3–3) McClintock

PSc 277: readings and discussions on Latin American political processes and institutions. PSc 278: individual research and class discussion on selected topics of Latin American politics. (Academic year)

279 **Seminar: International Relations of the Middle East** (3) Reich

Reading and research on the regional and international relations of the states of the Middle East. (Fall)

281–82 **Seminar: International Law** (3–3) Fischer

PSc 281: readings in selected areas of international law. PSc 282: research in selected areas of international law. (Academic year)

287 **Seminar: Problems in Latin American Civilization** (3) Staff

Interdisciplinary seminar partially guided by a specialist in the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

288 **Seminar: Soviet Military Policy and Strategy** (3) Wolfe

Soviet developments in military policy and strategy with attention to intra-bloc military cooperation, political context of Soviet military policy, significant changes in recent Soviet military thought. (Fall or spring)

290 **Topics in African Politics** (3) Nimer

Reading, research, and discussion of selected aspects of African domestic and international politics. (Spring)

291 **Governments and Politics of the Middle East** (3) Reich

Reading and research in selected problems in the governments and politics and international relations of the Middle East. (Spring, even years)

292 **Governments and Politics of North Africa** (3) Reich

Reading and research in selected problems in the governments and politics and international relations of North America. (Spring, odd years)

293 **Seminar: Governments and Politics of South and Southeast Asia** (3) Purcell

Research and selected reading as basis for analysis of structure, problems, and policies of the governments of selected countries in the area, with particular reference to India. (Spring)

294 **Seminar: Governments and Politics of Japan and Korea** (3) Staff

Readings, research, and discussion on the contemporary political problems and relevant historical background of Japan, North and South Korea. (Fall or spring)

295 **Seminar: Chinese Communist Foreign Policy** (3) Hinton
Objectives; formulation and implementation; Communist China as Asian state, revolutionary influence, would-be great power. Prerequisite: 3 semester hours selected from PSc 101, 194; or equivalent. (Spring)

296 **International Politics of the Far East** (3) Hinton
(Formerly The Communist Role in Far Eastern International Politics)
Foreign policies and international behavior of the regional states and the extraregional powers (principally the U. S. and the Soviet Union). (Fall)

297 **Independent Study** (arr.) Staff
Limited to master's degree candidates. Permission of instructor, in writing, required. (Fall and spring)

298 **Southeast Asia in World Politics** (3) Staff
Southeast Asia in great-power perspective. Balance-of-power concept and development of Asian subsystem. (Spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Fourth Group

Fourth-group political science courses are designed for graduate students who have appropriate third-group prerequisites. Offered as the demand requires.

307 **Political Parties** (3) LeBlanc
Advanced readings, group discussions, and research.

308 **Public Opinion and Political Socialization** (3) Darcy
Advanced readings, group discussions, and research.

309 **The American Presidency** (3) Wayne
Advanced readings and group discussions.

310 **American Legislatures** (3) MacKenzie
Advanced readings and group discussions.

311 **Comparative Government and Politics** (3) Kim, McClintock
Advanced readings and group discussions.

312 **Seminar: Comparative Government and Politics** (3) Kim, McClintock
Advanced research.

318 **Normative Political Theory** (3) Fischer, Linden
Advanced readings and group discussions.

325 **Research Seminar: Topics in Marxism-Leninism** (3) Elliott, Linden
Advanced research.

345 **American Politics** (3) LeBlanc, Darcy
Advanced research.

346 **American Government** (3) Wayne, Morgan
Advanced research.

375 **International Politics** (3) Nimer, Shaffer, Reich
Advanced readings and group discussions.

376 **Seminar: International Politics** (3) Nimer, Shaffer, Reich
Advanced research.

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

SERVICE-LEARNING POLITICAL SCIENCE

SECOND GROUP

154 **Law and Social Change** (6) Williams
Study of the legal system and its role in promoting social change. Readings, group discussions, and work with lawyers and 3rd-year law students. (Fall and spring)

155 **American Political Behavior** (6) MacKenzie
Internships in a variety of lobbying groups. Analysis of the structural and behavioral limitations which confront those who wish to exercise political influence. (Fall and spring)

Portuguese

See "Romance Languages and Literatures."

Psychology

Professors E.L. Phillips, J.N. Mosél, B.I. Levy, W.E. Caldwell, R.D. Walk (*Chairman*), R.K. White (*Emeritus*), M.L. Meltzer, A.D. Kirsch, C.E. Rice, E. Abravanel, D.E. Silber
Adjunct Professors R.F. Caron, J.B. Margolin
Professorial Lecturers R.K. Kahn, W.A. McClelland, M. Shore
Associate Professors C.E. Tuthill, R.H. Tanck (*Research*), S.A. Karp, R.W. Holmstrom, C.J. Lange, L.A. Rothblat
Adjunct Associate Professor D.G. Kleiman
Associate Professorial Lecturers S.L. Cohen, J. Boriello

Assistant Professors P.J. Poppen, L. Brandt-Emler, S.K. Green
Adjunct Assistant Professor E.B. Lehman
Assistant Professorial Lecturer S.A. Sibley

CLINICAL TRAINING STAFF

Associate Professor J.J. McMillan
Associate Clinical Professors I.M. Zimmerman, B. Becker, J.W. Cummings, M.E. Zedek, E. Blum, P.D. Daen, R.K. Kamer
Assistant Clinical Professor A.A. Adams, P.B.B. Crowe

Bachelor of Arts with a major in Psychology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—seven or eight semester hours selected from Psyc 1, 5 and 6.
3. Required courses in related areas:

(a) three semester hours selected from Stat 51, 53, or any first-group course in mathematics except Math 6. (Students expecting to do graduate study in psychology should elect Stat 53.)

(b) 12 semester hours selected from American civilization, anthropology, economics, geography and regional science, history, philosophy (Phil 71, 113, 151 recommended), political science or sociology, of which six hours must be from *one* of the following: anthropology, economics, history, political science or sociology. If a student takes more than six hours in any one department, the excess will be credited to electives.

4. Required courses in the major—24 semester hours in second-group psychology courses, including Psyc 196 and one course from each of the following groups: *Group A:* Psyc 118, 121, 161; *Group B:* Psyc 115, 144, 151, 156; *Group C:* Psyc 101, 112, 129, 131.

It is recommended that students contact their academic advisers as soon as possible for assistance in planning their programs of study.

Although there is no foreign language requirement, students contemplating graduate study are reminded that most graduate schools require knowledge of one and sometimes two foreign languages.

Master of Arts in the field of Psychology.—Prerequisite: the degree of Bachelor of Arts with a major in psychology at this University, or an equivalent degree. Admission to the program is limited; preference will be given those who plan to continue toward a Doctor of Philosophy degree.

Required: the general requirements, pages 95–102. Of the 24 required semester hours (exclusive of the thesis), a minimum of 18 must be in third-group psychology courses including Psyc 202 and either 203 or 204; 6 may be in related fields approved by the department. For detailed requirements consult the chairman of the department.

Doctor of Philosophy in the field of Psychology. Prerequisite: the degree of Bachelor of Arts with a major in psychology. Students admitted from other disciplines will be expected to complete prerequisite undergraduate courses to prepare for graduate study in psychology. Qualifying scores on the Miller Analogies Test and the Aptitude Test of the Graduate Record Examination are required for admission.

Required: the general requirements, pages 95–97, 102–104, including (1) the satisfactory completion of the tool requirement (see page 103), (2) Psyc 202, 203–4, Stat 105; and (3) the satisfactory completion of a Preliminary Examination and later, a major Field Examination.

reas of study: clinical, developmental, experimental, industrial and organiza-l, and social psychology.

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udents electing psychology courses in the freshman year should begin with 1; with permission of instructor students may elect Psyc 5–6 in the freshman

epartmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses sychology. Six semester hours in psychology courses are prerequisite to all sec-group courses in psychology. The departmental prerequisite may be waived with permission of the instructor

RST GROUP

1 **General Psychology** (3) — Staff

Fundamental principles underlying human behavior. (Fall and spring)

5–6 **Principles and Methods of Psychology** (4–4) — Walk and Staff

Lecture (3 hours), laboratory (3 hours). An experimental approach to understanding behavior; individual and class experiments performed. Psyc 5: sensation, perception, and emotions and their relation to adaptive behavior. Psyc 6: topics of motivation, learning, memory, and problem-solving. Laboratory fee, $6 a semester. (Academic year)

8 **Psychology of Motivation and Personality** (3) — Tuthill, Rice, Holmstrom, Brandt-Emler

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized. (Fall and spring)

22 **Introduction to Educational Psychology** (3) — Kirkbride, Tanck, McClelland

The contributions of psychology to education; emphasis on learning. Field work is required for all education majors. (Fall and spring)

29 **Psychology of Childhood** (3) — Brandt-Emler

Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world. (Fall and spring)

ECOND GROUP

101 **Abnormal Psychology** (3) — Silber, Holmstrom

Causes, diagnosis, treatment, and theories of various types of maladjustments and mental disorders. Prerequisite: six semester hours in psychology or three in psychology and six in a biological science. (Fall and spring)

104 **Ecology and Mental Health** (3) — Karp

Examination by field research of the linkages between aspects of the physical environment and mental health. Lectures and student field research projects. (Fall)

105 **The Psychology of Consumer Behavior and Attitudes** (3) Phillip

Consumer behavior and attitudes in regard to advertising, buying habits, consumer action groups and social pressures, and mass persuasion. Lecture and field work. (Spring)

108 **Humanistic Psychology** (3) Mos

Critical examination of humanistic psychology. Emphasis on role of consciousness in human behavior. Philosophic foundations, existential and phenomenological psychology, the new mentalism.

110 **Perception and Understanding in Children** (3) Abravan

(Formerly Cognitive and Perceptual Development)

Concepts and research in the area of developmental psychology; emphasis on the growth and development of perception, cognition, and language. (Spring)

112 **Psychology of Adolescence** (3) Johnson and Staff

Psychological characteristics and problems peculiar to adolescence, with emphasis on application of psychology to solution of such problems. (Fall)

115 **Psychology of Language and Communication** (3) Mos

Introduction to psycholinguistics and verbal behavior. Information theory, generative grammar theory, cultural and linguistic structures in the perception and learning of language. (Fall and spring)

117 **Psychology of Art and Picture Perception** (3) Wa

Theories of Arnheim, Gibson, Gombrich, and Goodman as related to art and picture perception; study of cross-cultural research and research with children.

118 **Neuropsychology** (3) Rothbl

Analysis of neural processes underlying behavior. Basic structure and functions of the nervous system, with emphasis on sensory processes, learning and memory, motivation, and emotion. (Fall and spring) Staff

121 **Psychology of Learning** (3)

Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects. (Fall) Silv

122 **Psychology and Human Relations** (3)

Understanding human relations and T-group techniques by evolving an on-going T group within the course itself. For junior and senior undergraduate social science majors; open to others with permission of instructor. (Summer) Abravan

124 **Aggression: Its Nature and Determinants** (3)

Study of research with adults, children and animals; influence of mass media and cultural comparisons in handling and channeling aggression. Examination of contemporary theories of aggression. Karp, Popp

129 **Theories of Personality** (3)

Survey of personality theories; emphasis on their application to problems of individuals. (Fall and spring)

130 **Seminar: Political and Social Implications of Current Approaches to Psychological Treatment** (3) — Karp

Discussion and presentation of recent works, such as those of Szasz, Goffman and various writers on minority liberation, bearing upon the implications for individuals and society of various approaches to psychological treatment, including psychotherapy and behavior modification.

131 **Psychological Tests** (3) — Hunt, Karp, Holmstrom

Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7. (Fall and spring)

132 **Socialization in Childhood** (3) — Brandt-Emler

Examination of primary methods by which the child is shaped in terms of social judgment and self control; internalization of controls, assimilation of societal values and parenting procedures. Organized by focus on issues according to developmental level.

135–36 **Seminar: Community Mental Health** (3–3) — Levy and Staff

Survey of issues and techniques in community mental health; emphasis on educational systems and community mental health in the schools. Involves practicum work in school setting. Participation both semesters expected. Open to juniors and seniors with permission of instructor. Prerequisite to Psyc 136: Psyc 135. (Academic year)

144 **Personnel and Industrial Psychology** (3) — Mosél

Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation and productivity. (Fall)

150 **Psychology of Sex Differences** (3) — Poppen

Relevant biological, psychological, and sociological influences on males and females in the development of sex differences: hormonal differences, gender identity, differential socialization of sons and daughters, masculinity/femininity, cultural evaluation of male and female roles. Survey of relevant psychological theory. Emphasis on empirical research and hypothesis testing.

151 **Social Psychology** (3) — Tuthill, Poppen, Green

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism and war. (Fall and spring)

154 **Psychology of Criminology** (3) — Silber

Examination of many psychological aspects of criminal behavior; personality of criminals and of psychological processes affecting behavior.

156 **Psychology of Attitudes and Public Opinion** (3) — Tuthill

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare. (Spring)

158 **Psychology of Interpersonal Attraction** (3) — Green

Psychological bases for interpersonal attraction; emphasis on personal variables, relevant theoretical approaches and effects of attraction on other behavior.

161 **Comparative Psychology** (3) Caldwe

Lectures and demonstration on animal psychology. Psychological proc esses in infrahuman organisms, evolution of behavior, the place of anim experimentation and research in psychology. (Spring)

170 **Clinical Psychology** (3) Lev

An exploration of the history, functions, and problems of the clinica psychologist. Assessment, treatment, community approaches, ethics. Pre requisite: Psyc 101, 131. (Spring)

188 **Attitudes toward Death and Dying** (3) Staff

Exploration of the many different aspects, attitudes, and experiences as sociated with the process of death and dying. Limited to juniors and seniors

191 **Independent Research in Psychology** (3) Staff

Opportunity for work on individual library or experimental projects. Open to qualified students by permission; arrangements must be made with the sponsoring faculty member prior to registration. May be repeated once for credit. (Fall and spring)

192 **Field Experience in Psychology** (3) Abravanel

Selected senior psychology majors will spend a minimum of 6 hours a week in a local hospital, school, or community setting. Students register ing for this course must have the approval of the instructor by May 1 for the fall semester and by December 15 for the spring semester (Fall and spring)

196 **History and Systems of Psychology** (3) Caldwell, Ra

Senior capstone course which includes a survey and integration of the major viewpoints and concepts of psychology. Required of Psychology majors. (Fall and spring) Staff

197 **Honors Seminar in Psychology** (3)

Selected topics in psychology which change from semester to semester Intended primarily for juniors who plan to enroll in Psyc 191 (independent research) in the senior year. May be repeated for credit. Staff

198 **Current Research Issues in Psychology** (3)

Conducted as a seminar. Recent experiments in psychology, includ those performed by members of the class; emphasis on student particip tion. May be repeated for credit. (Spring)

THIRD GROUP

Third-group courses are limited to graduate students in psychology, except by spe permission of instructor.

202 **Psychological Research Methods and Procedures** (3) Abravanel, Holmstro Staff

Required in all graduate Psychology programs. Prerequisite gradu standing, a laboratory course in psychology, and an elementary cou in statistics. (Spring)

203–4 **Experimental Foundations of Psychology** (3–3) Rothblat and Staff

Required of doctoral students in Psychology during first year of study. Psyc 203: basic issues in learning and motivation. Psyc 204: physiological processes; sensation and perception. (Academic year)

205 **Research Methods in Intervention Programs** (3) Karp

Special problems of conducting research in a clinical setting; emphasis on content and method of studies designed to assess effects of therapeutic intervention. Prerequisite: Psyc 202. (Fall)

206 **Methods of Clinical and Personality Research** (3) Rice

Review of techniques especially relevant to research in clinical, personality, and social psychology. Scaling methods, multivariate techniques, introduction to the use of computers in data analysis. Prerequisite: Psyc 202; Stat 105 or equivalent. (Spring)

207–8 **Psychological Assessment** (3–3) Holmstrom, Levy, Silber

Open only to clinical graduate students in the Department of Psychology. Theoretical and clinical aspects of assessment; includes interviewing, psychometric tests, and projective techniques. Two-hour laboratory—diagnostic work at clinical facilities. Material fee, $7 a semester. (Academic year)

209 **Seminar: Psychology of Motivation** (3) Caldwell

Various theoretical approaches to the psychology of motivation: systematic concepts and experimental findings deriving from each approach. (Spring)

211 **Assessment of Cognitive Functioning** (3) Levy

Concepts of intelligence and achievement and their assessment through a variety of individual procedures. Material fee, $7. Admission by permission of instructor. (Summer)

212 **Personality Assessment by Projective Techniques** (3) Levy

Methods of personality assessment, primarily the Rorschach. Material fee, $7. Admission by permission of instructor. (Summer)

213–14 **Seminar: Developmental Psychology** (3–3) Abravanel, Walk, Lehman, Brandt-Emler

Psyc 213: research and theory in developmental psychology, emphasis on perceptual and cognitive development; consideration of the development of social awareness and of genetic-biological growth processes. Psyc 214: current research and theory in perceptual and cognitive development, intensive study of selected research problems. (Academic year)

215 **Personality Assessment by Multiple Procedures** (3) Shore

Consideration and use of a wide range of procedures in assessment of personality and psychopathology of children. Prerequisite: Psyc 207–8 or 211 and 212. Graduate students in fields other than Psychology admitted by permission of instructor. Material fee, $7. (Summer)

216 **Psychological Assessment by Graphic Means** (3) Levy

Examination of graphic procedures for assessment of intelligence and personality: clinical use and evidence of validity. Common interpretive

principles sought. Human figure drawings and free paintings as examples. Admission by permission of instructor. (Fall)

218 **Seminar: Systems of Psychotherapy** (3) Silbe

Introduction to theory and technique of psychotherapeutic approaches: psychoanalytic, ego-centered, nondirective, transactional, and others. Original sources surveyed. Limited to graduate students in clinical psychology except when offered in Summer Sessions. (Spring)

220 **Seminar: Abnormal Psychology** (3) Silbe

Study of selected problems of psychopathology. (Fall)

221–22 **Seminar: Group Psychotherapy** (3–3) Borielle

For graduate students in the clinical psychology program. Open to others if space permits and with permission of instructor. Psyc 221: didactic material and laboratory experience with emphasis on group dynamics and processes; survey of group therapy approaches. Psyc 222: supervised experience with therapeutic groups. Prerequisite to Psyc 222: Psyc 221. (Academic year)

223 **Seminar: Learning** (3)

Selected topics of current research interest in the psychology of learning. (Spring)

226 **Seminar: Clinical Psychology of Childhood and Adolescence** (3) Kalle

Survey of behavior and personality disorders.

227–28 **Seminar: Principles of Psychotherapy** (3–3) Phillips

For graduate students in clinical psychology; open to others with permission of instructor, only if space permits. Patient's needs and demands on the therapist. Case participation heavily relied upon. Prerequisite: Psyc 218. (Academic year)

229 **Seminar: Principles of Behavior Change** (3) Sible

Stimulus-organism-response variables and their interactions, with emphasis on learning theory as applied to clinical problems. (Fall)

230 **Seminar: Operant Applications to Clinical Problems** (3) Mow

Examination of the broad role of reinforcement contingencies, behavior shaping, and other experimentally derived concepts as they apply to the management and control of a wide variety of human clinical problems. Prerequisite: Psyc 229. (Spring)

231 **Development of Psychometric Instruments** (3) Mow

Quantitative techniques and principles used in construction, standardization, and evaluation of personality and ability measures for research and practice; quantification of human judgment for measurement purposes. Prerequisite: course in tests and measurements and an elementary course in statistics. (Fall)

234 **Seminar: Theory of Psychological Measurement** (3)

Development of classical axiomatic-deductive theory underlying major assumptions in the construction and evaluation of psychological tests. (Spring)

235–36 **Seminar: Community Mental Health** (3–3) Levy and Staff

For graduate students in the department of psychology; open to others, with permission of instructor, only if space permits. Survey of issues and techniques in community mental health; emphasis on educational systems and community mental health issues in the schools. Involves project in school setting. Prerequisite to Psyc 236: Psyc 235. (Academic year)

245 **Seminar: Organizational Behavior** (3) Mosél

Analysis of organizational behavior; emphasis on motivation and productivity. Recent research on employee attitudes, primary group, supervisory leadership, formal and informal organization, job design. (Fall)

246 **Seminar: Personnel Measurement Techniques** (3) Mosél

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, and performance ratings.

248 **Organizational Behavior Research Applied to Organizational Intervention and Change** (3) Cohen

Emphasis on development of models of organizational effectiveness; design of valid diagnostic instruments; implementation of research strategies, establishment of program-evaluation criteria. (Spring, even years)

251 **Seminar: Advanced Social Psychology** (3) Tuthill, Poppen, Green

Current research and theory: motivation and cognition, dissonance, social interaction theory, authoritarianism, class differences, group dynamics, group conflict. (Fall)

252 **Research Methods in Social Psychology** (3) Tuthill, Poppen, Green

Selected methods such as public opinion polling, attitude scaling, interviewing, content analysis, naturalistic observation, field research or laboratory experimentation. (Fall and spring)

254 **Seminar: Experimental Social Psychology** (3) Tuthill

Experimental study of small groups, group climates, interaction process analysis. Lewin's field-theoretical approach to individual and group processes. (Spring, odd years)

256 **Seminar: Psychological Causes of War** (3) White

An attempt to integrate evidence from animal behavior, child behavior, anthropology, psychiatry, and recent history, including World Wars I and II and the present East-West conflict. (Spring)

258 **Seminar: Attitude Change** (3) Tuthill

Review of recent research literature on attitude formation and change. Examination of theories of attitude change and experimental findings. (Spring, even years)

259 **Seminar: Psychology of Communism** (3) White

Public and governmental opinion in communist countries, authoritarian thinking, communist propaganda, problems of Western communication with communist countries. (Fall, odd years)

261 **Seminar: International Communication** (3) Mose

Primarily for students in the schools of Government and Business Administration and Public and International Affairs. Communicating information and effecting attitude change across cultures by mass media. Psychocultural factors and the functions of mass communication in the development of transitional societies. (Spring)

*267 **Interdisciplinary Study of Language Disorders** (3)

For graduate students in education, speech and hearing and psychology. Psycho-educational team participation, team diagnosis and analysis of case studies. Multidisciplinary understanding of philosophies of learning and treatment of symbolic malfunctioning. (Fall)

268 **Seminar: Neuropsychology** (3) Rothblat

Selected problems in research relating the brain and behavior. Independent topics each semester such as sensory processing, brain development and behavior, clinical aspects of nervous system function.

*269 **Practicum: Interdisciplinary Study of Language Disorders** (3)

For graduate students by arrangement with the Reading Center, the Speech and Hearing Clinic or the Clinical Psychology Program. Psycho-educational teams working in clinical setting providing assessment and remediation of symbolic malfunctions.

272 **Seminar: Theories of Personality** (3) Caldwell

Emphasis on theoretical problems and methodology in the field of personality study. (Fall, odd years)

274 **Comparative Psychology and Ethology** (3) Caldwell

Synthesis of the principles and findings of ethology and comparative psychology. Examination of the theories and findings of Lorenz, Tinbergen and Jakob von Uexküll in the light of recent experimental investigations. (Fall, even years) Silbe

283–84 **Practicum in Clinical Psychology** (3–3)

Supervised practical instruction in agencies doing clinical psychological work; requires 64 full-time days during the year. Prerequisite: Psyc 21. Admission by permission of instructor. (Academic year) Staff

289 **Seminar: Current Topics in Experimental Psychology** (3)

Review and discussion of contemporary research and theory in a specialized field of psychological study, by leaders in the field. Independent topics each semester; may be repeated for credit. (Fall and spring) Cobb

291 **Theories of Organizational Behavior** (3) (Spring) W

Examination of current theoretical models and research.

292 **Seminar: Perception** (3)

Study of current research and theory in the experimental psychology of perception. (Spring)

* An interdisciplinary course offered by the departments of education, psychology and speech-drama

† An interdisciplinary course offered by the departments of education and psychology

293 **Seminar: Psychology of Thinking** (3) Rice

Review of basic theoretical positions concerning the processes of cognition: memory, concept formation, and reasoning. (Spring 1976 and alternate springs)

295 **Independent Research in Psychology** (3) Staff

Individual library or experimental research under supervision of staff member. Arrangements must be made with sponsoring faculty member prior to registration. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy major field examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

RELATED COURSE IN PSYCHIATRY AND BEHAVIORAL SCIENCES

The following course, offered by the department of psychiatry and behavioral sciences in the University's School of Medicine and Health Sciences, is opened to advanced graduate students in clinical psychology. For detailed description, consult the *School of Medicine and Health Sciences Catalogue*.

365–66 **Seminar: Clinical Introduction to Family Diagnosis and Therapy** (3–3)

Public Administration

Professor D.S. Brown
Professorial Lecturers B. Posner, C.L. Berg, L. Levine, T.W. Taylor, J.L. Westrate
Associate Professors S.R. Chitwood, M.M. Harmon (*Chairman*)
Associate Professorial Lecturer J.F. Magnotti, Jr.
Assistant Professors I. Dubinsky, B.L. Catron
Assistant Professorial Lecturers M. Springer, M.B. Young

Programs of study in Public Administration leading to the degrees of *Master of Public Administration*, *Master of Arts in Government*, and *Doctor of Public Administration* are offered by the School of Government and Business Administration (see pages 138–72).

THIRD GROUP

210 Concepts and Issues in Public Administration (3) Brown, Harmon

Introduction to graduate study in public administration. Professionalism and the public service. Nature of public interest; multiplicity of organizational objectives. Administrative responsibility and individual and organizational ethics. Individual goals and career planning. (Fall and spring)

213 Administration in the Federal Government (3) Brown, Taylor, Westrate

Critical analysis of federal administrative organizations as an integral part of the political system. Roles of Congress, the President, the courts, interest groups, political parties, and the public in the public decisional process. Special attention to centripetal and centrifugal forces. (Fall and spring)

214 Policy Analysis in Public Administration (3) Catrou

Introduction to systematic analysis of public policy alternatives. Development of conceptual frameworks for differentiating types of public policies, e.g., distributive, regulatory, redistributive; examination of the contribution of economic, quantitative, and research techniques to the development, administration, and evaluation of these policies. (Fall and spring)

217 Seminar: Development Administration I (3) Belaunde-Terry

The nature of underdevelopment. Specific problems of less developed countries. National cultures and political and administrative systems. The giving of assistance, types of foreign aid; problems of working with aid-givers. (Fall)

218 Seminar: Development Administration II (3) Brown

Problem of the transfer of administrative capability from one country to another. Political and administrative development. Unilateral and multilateral approaches. The role of the innovator. Strategies of administrative development. (Spring)

220 Law and the Public Administrator (3) Chitwood

Exploration and analysis of the functions of law in a democratic society. Emphasis is placed upon the procedural, historical, and jurisprudential dimensions of American law. This broad perspective seeks to convey a more perceptive understanding of the law as a legal and moral force guiding and constraining public decision making. (Spring)

221 Organization Theory and the Public Sector (3) Cal...

Analysis of organization theory with special focus on public organizations; current issues in organization theory; decision-making, the organizational environment, and the changing nature of organizations in a post-industrial society. (Fall and spring) Brow...

223 Behavioral Factors in Large Organizations (3)

Analysis of the nature and characteristics of large organizations, bureaucracies and their behavioral patterns, dysfunctionalism. Approaches to policy guidance and leadership, particularly in large public organizations; influence and control systems. Future trends. (Fall and spring)

231 **Public Personnel Administration** (3) Sommers

Survey of basic principles and functions of personnel administration in the public service. Roles of personnel management, recruitment, placement, wage and salary administration, training, retirement, and other personnel functions. (Fall)

232 **Problems in Public Personnel Management** (3) Sommers

Analysis and evaluation of major personnel management problems in government; employee-management relations; interagency and intergovernmental relationships. Impact of automation. Evaluation of personnel systems. (Spring)

233 **Seminar: Manpower Development and Utilization** (3) Dubinsky

Examination of public and private manpower trends, problems, policies, and programs. Exploration of approaches, old and new, to manpower development and utilization. Analysis of impact of economic, political, and social factors on manpower. Students will select a specific area for individual investigation. (Fall)

235 **Technology Change and Professional Human Resource Planning** (3) Roman

(*Formerly Technological Change and Manpower*)

Research, discussion, and readings dealing with manpower problems arising from automation and other technological changes. Evaluation of these developments in government and business; their implications for productivity, employment, training and education, and personnel and industrial relations. Analysis of economic, political, and social factors influencing public and private manpower policies. (Spring)

245 **Intergovernmental Relations** (3) Magnotti

Assessment of the impacts and consequences of changes in the administration of intergovernmental policies and programs in the federal system. Legislation, roles, and responsibilities of federal, state, regional, and local systems will be examined from both theoretical and practical vantage points to understand their effects. (Fall and srping)

246 **Dynamics of Citizen Participation in Administration** (3) Dubinsky

Examination of the nature of participation in a democratic society. An analysis of the characteristics and dynamics of citizen-based organizations. Exploration of effective methods or models by which administrators may utilize citizen participation. (Fall)

248 **Financing Local Government** (3) Staff

Analysis of the structure and administration of public finance in local governments. Includes the financing of services through municipal taxation and other revenue sources, debt administration, and implications of the budgetary process. (Fall and spring)

249 **Urban Public Policy** (3) Staff

Examination of views of the city. Emphasis on urban systems in their social, political, economic, and physical aspects. Against the background of urban politics and administration, will address such central functional areas as health, education, welfare, crime, poverty, transportation, and housing. (Fall and spring)

250 **Administration of State and Local Governments** (3) Staff

Examination of state and local governmental structures and functions, public and private demands, their place within the federal system, their limitations, and alternatives available to encourage more effective administration. (Fall and spring)

251 **Governmental Budgeting** (3) Page, Posner

Survey of the basic concepts, principles, and practices in governmental budgeting; interrelationship of planning, programming, and budgeting, their role in the management process. (Fall and spring)

252 **Public Expenditure Analysis and Planning** (3) Chitwood

Intensive analysis of managerial and economic procedures and techniques used by government agencies for planning, allocating, and managing scarce resources in the achievement of public programs. Topics discussed include benefit-cost analysis, program budgeting, systems analysis, present value analysis, and government contracting. (Fall and spring)

260 **Policy Formulation and Administration** (3) Harmon, Springer

Analysis in depth of factors and processes involved in policy development with particular attention to selected areas of national policy; development of agency goals and objectives. (Fall and spring)

262 **Seminar: Science, Technology, and Public Policy** (3) Black

The impact of science and technology upon public administration in terms of both administrative practice and national policies. (Spring)

290 **Special Topics in Public Administration** (3) Staff

Experimental course offering; new course topics and teaching methods. May be repeated once for credit. (Fall or spring)

292 **Public Program Evaluation** (3) Dubinsky

Theory and practice of program evaluation and evaluative research. Exploration of scope and limitations of current practice in evaluation due to economic, political, social, and administrative factors. Examination of methodological considerations for data collection, analysis, and dissemination. Students will conduct individual evaluative projects. (Spring)

295 **Research Methods** (3) Dubinsky

Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings. (Fall and spring)

298 **Directed Readings and Research in Public Administration** (3) Staff

Supervised reading in selected fields within public administration. Admission by permission of instructor. May be repeated once for credit. (Fall and spring)

299 **Thesis Seminar** (3) Staff

Examination of thesis standards, research philosophy and methodology in public administration. (Fall and spring)

300 **Thesis Research** (3)

(Fall and spring)

FOURTH GROUP

Fourth group public administration courses are limited to graduate students and are primarily for doctoral students. They are offered as the demand requires.

373 **Seminar: Public Administration and American Political and Social Institutions** (3) Chitwood

(Formerly PAd 273 Colloquium: Public Administration and American Political and Social Institutions)

Supervised in depth study of contemporary literature in selected fields and of research methodology in public administration.

374 **Seminar: Trends in Public Administration Theory** (3) Harmon

(Formerly PAd 274 Colloquium: Trends in Public Administration Theory)

Survey of contemporary normative and epistemological issues in public administration theory and practice. Analysis of the past and present influence of logical positivism, behavioralism, humanism, existentialism and phenomenology. Required for doctoral students.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Public Administration general examination. May be repeated for credit

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Public Administration candidates. May be repeated for credit

Public and International Affairs

Professors R.H. Davison, J.W. Kendrick, R.B. Thompson, J.N. Mosél, F.H. Michael, J. Aschheim, H.L. LeBlanc, R.K. White (*Emeritus*), A. Gyorgy, B. Nimer, R.P. Sharkey, C.T. Stewart, Jr., J.W. Robb, H.B. Yakobson, H.C. Hinton, H.M. Sachar, G. Stambuk, H. Solomon, V. Petrov B.M. Sapin, C. Shih, R.K. Lewis, C. Hsieh, G. Sigur, M. Gordon, P.P. Hill, J.A. Morgan, J. R. Thornton, H. Pollack (*Research*), B. Reich, Y. Kim

Professor Emeritus J.F. Carroll, A. Halpern

Professorial Lecturers J. Hardt, T. Hsia, B. Ramundo, T.W. Wolfe, E.M. Hadley, J.F. Coates

Associate Professors W.R. Johnson, C.A. Moser, K.Y. Yin, J.K. McDonald, C.J. Elliott, R.M. Dunn, Jr., C.A. Linden, S.J. Wayne, J.M. Logsdon, P.F. Klarén, H.R. Nau

Research Associate Professor D. Robinson

Associate Professorial Lecturer P. True

Assistant Professors G.C.Y. Wang, D.I. Lee, R.E. Darcy, J.M. Starrels, S.W. Burks, S.V. Grant, A.M. Yezer, R.L. Cole, D. Fischer, K.J. Langran, L.P. Rotullo

Assistant Professorial Lecturer L.L. Perez

Programs of study in Chinese Language and Literature, East Asian Studies (China and Japan), International Affairs, Public Affairs and Urban Affairs leading to the

degree of *Bachelor of Arts* and programs of study in International Affairs, Latin American Studies, Public Affairs, Russian Studies, and Science, Technology, and Public Policy leading to the degree of *Master of Arts* are offered by the School of Public and International Affairs (see pages 173–90).

INTERNATIONAL AFFAIRS

The following courses are offered only in the War College curriculum:

260 **Fundamentals of National Power** (3)

261 **International and U.S. Foreign Policy** (3)

262 **National Security Policy of the United States** (3)

297 **Readings in International Affairs** (1, 2, or 3)

299–300 **Thesis Research** (3–3)

Religion

Professors R.G. Jones (*Chairman*), H.E. Yeide, Jr., D. Wallace, Jr.
Professorial Lecturer A. Lustig
Associate Professor A.J. Hiltebeitel
Associate Professorial Lecturer E.S. Jospe
Assistant Professors S.A. Quitslund, D.A. Altshuler

Bachelor of Arts with a major in Religion (Field-of-Study).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91.
2. Prerequisite courses—Rel 9, 10, and 59-60.

The coordinated field of knowledge upon which the student will be examined for a major examination at the end of the senior year includes the history and literature of the world's religions and the philosophical and ethical problems of religious thought. A student may elect to give special emphasis to Christianity, Judaism or the religions of India. A proseminar (Rel 199–200) assists the student in preparing for the major examination. A pamphlet containing a detailed description of the major is available in the offices of the dean of Columbian College of Arts and Sciences and the chairman of the department of religion.

Master of Arts in the field of Religion.—Prerequisite: the degree of Bachelor of Arts with a major in religion from this University, or an equivalent degree.

Required: the general requirements, pages 95–102. Of the 24 semester hours required courses (exclusive of the thesis), at least 12 must be in third-group religion courses; a maximum of nine may be in a closely related field outside the department of religion as approved by the department. The Master's Comprehensive Examination must cover three fields (the thesis research must be on one of these three fields) selected from the following: the Old Testament, the New Testament, history of Christianity, Judaism, history of religion in America, modern religious thought, ethics, sociology of religion and history of religions. A reading knowledge examination, usually in French or German, is required, however, Hebrew or Greek is acceptable for those students whose thesis area is in the Biblical field and Sanskrit or an Eastern language for those whose thesis area is in the history of religions.

Master of Arts in the field of Religious Education.—Prerequisite: the degree of Bachelor of Arts with a major in religion from this University, or an equivalent degree. The undergraduate program should have included the following courses or equivalent: Anth 1; Educ 108; Psyc 1, 22, and 29; SPDR 1 or 11.

Required: the general requirements, pages 95–102. Of the 24 semester hours of required courses (exclusive of the thesis), at least six must be in third-group religion courses; a maximum of 12 may be in a closely related field outside the department of religion as approved by the department.

*Master of Arts in the field of Religion and Medical Care**.—Prerequisite: (1) the degree of Bachelor of Arts with a major in religion from this University, or an equivalent degree; (2) a first professional theological degree; or (3) acceptable academic work required of entering medical students who have not earned a Bachelor's degree, but who are pursuing the degree of Doctor of Medicine.

Required: the general requirements, pages 95–102. The program of study consists of 36 semester hours of approved course work with or without a thesis. Students must elect course work covering four fields selected from clinical pastoral care, religion, sociology, psychology, health care administration and medicine. The course work in these fields must be distributed as follows: 12 semester hours each selected from two fields and at least six hours in clinical pastoral care. The Master's Comprehensive Examination must cover three fields selected from the list above, one of which, as approved by the department, must be outside of the department of religion. Supervised clinical education may be offered as a tool subject in lieu of the required reading knowledge examination in a foreign language.

Master of Arts in the field of History of Religions—Hinduism.—(Consortium of Universities program). Prerequisite: the Bachelor of Arts degree from this University with suitable background in the study of religion of South Asia or an equivalent degree.

Required: the general requirements, pages 95–102. The program of study consists of 24 hours of course work (exclusive of thesis) selected from upper-division and graduate courses of member universities of the Consortium as determined by the department of religion, including a sequence of four courses in the literature of the Hindu tradition and one course in method in history of religions. The Master's Comprehensive Examination must cover the following: methods in the study of religions, thematic comparisons between the Hindu tradition and at least two other religious traditions, including at least one Western tradition, and a special field in Hindu tradition. A reading knowledge examination in a foreign language, usually in French or German, will be required, and a student must take at least two semesters of either Sanskrit or Hindi in addition to the 30 hours of required courses for graduate credit. More complete information regarding courses and requirements is available from the program adviser, Associate Professor A. J. Hiltebeitel, department of religion.

Doctor of Philosophy in the field of American Religious History (offered in cooperation with the department of history).—Required: the general requirements, pages 95–97, 102–104. The General Examination must cover four fields, including two from the department of religion (history of religion in America and either early Christianity or European Christianity since 1500) and two from the department of history (generally American social history and one other).

FIRST GROUP

9 The Hebrew Scriptures (3) **Staff**

Historical and literary study of the Hebrew Scriptures with consideration

*Certain courses in this program are offered only through Off-campus Centers of the College of General Studies.

of development of religious ideas, institutions, and outstanding personalities. (Fall)

10 **The New Testament** (3) Jones

Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles. (Spring)

21 **Religion and Man's Search for Meaning** (3) Yeide

Traditional religious concepts, language of contemporary religion amidst modern scientific and secular intellectual tendencies, and the place of religion in today's society. (Fall)

22 **Religion and Contemporary Social Issues** (3) Yeide

Illumination of social problems by ethical reflection; examination of ethical perspectives as stimuli and barriers to social change; techniques for maintaining social values and seeking change. (Spring)

23 **Judaism: Identities and Ideas** (3) Altshuler

Exploration of important practices and beliefs in classical and modern times; study of people and texts which confront tradition and change. (Fall)

59–60 **History of Religions** (3–3) Wallace, Hiltebeitel

Origins, evolution, and contemporary status in historical context. Rel 59: primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam). (Rel 59 and 60—fall and spring)

SECOND GROUP

103 **The Prophets** (3) Quitslund

Development of prophetism in the Old Testament; cultural, economic, psychological, and religious factors; elements of lasting value in the prophetic teaching. Study of selected prophets. (Fall)

104 **The Life and Thought of Jesus** (3) Quitslund

Comprehensive study of the life and teachings of Jesus with critical attention to sources. (Spring)

105 **The Life and Thought of Paul** (3) Quitslund

Backgrounds of early Christianity, first-century religious and social conditions affecting the spread of Christianity, the life and journeys of Paul, Paul's presentation of the Christian faith.

107 **Rabbinic Literature and Thought** (3) Altshuler

(Formerly Rel 139 Meaning of the Talmud in Jewish Life)

Readings of the Mishna, Talmud, exegetical midrashim and targumin in English translation. Methods of literary and historical analysis introduced and applied. Individual research projects. (Fall)

111 **Myth, Epic and Novel** (3) Hiltebeitel

Exploration of the religious themes and cultural significance of literature: e.g., Indian and Babylonian epic, the Bible, Greek epic and drama; Dante

and Milton: Dostoevsky, Kafka, Hesse, Faulkner, Beckett, and Clark. (Spring)

113 **Early Post-Biblical Judaism** (3) Altshuler

History of Judaism from Ezra through the destruction of Jerusalem in 70 CE—the canonization of the Pentateuch. Hellenism. Maccabean revolt, growth of sectarian movements, Herod, ferment against Rome in context of Eastern and Western political currents. Use of primary sources, especially the Bible, Josephus, rabbinic and noncanonical writings.

114 **Judaism in the Rabbinic Period** (3) Altshuler

From 70 CE through end of rabbinic period. Focus on religious responses to destruction of the Temple; apocalyptic thinking and revolt of Bar Cochba; rabbinic and patriarchal responses to Roman authority; Tannaitic and Amoric Judaism in Palestine and Babylonia; mystical and folk religion phenomena preserved in art and literature.

115 **Judaism in the Medieval Period** (3) Altshuler

History of relations with non-Jews. Daily life and education of the ordinary Jew; rabbinical law and interpretation of scripture; Jewish philosophers, mystics, sects and messianic movements. (Fall)

116 **Judaism after Emancipation** (3) Altshuler

Transformation of community and beliefs among Jews beginning with catalyst of their political emancipation. Responses to beginnings of modernity among Jews in Europe, America and Israel. (Spring)

122 **Christian Ethics and Modern Society** (3) Yeide

Nature and principles of Christian life as developed by the Christian community; problems of personal conduct; application to family, social, and economic institutions.

124 **Contemporary Movements in Theology** (3) Quitslund

Theological approach and systems of a selected number of modern theologians. (Fall)

126 **Western Mysticism** (3) Quitslund

Study of the phenomenon of religious experience and of selected mystics in Judaism, Christianity and Islam.

127 **Medicine, Religion, and Healing** (1) Staff

Total care concept. Importance of religion in medical practice for patient and physician. Concept of the professional man, the clergy's role in healing, religious perspective on issues in medical ethics. (Spring)

137 **The Land of Israel and the Growth of the Western Religions** (6) Staff

138 **Major Trends in Modern Judaism** (3) Staff

Religious developments in Judaism as reflected in major writers and movements since Mendelssohn. Writings illustrative of Orthodox, Conservative, Reform and Reconstructionist thought.

141–42 **Religious Education** (3–3)

Religious education in the home, church, and community; basic educational procedures and special techniques; organization and administration.

143 **Early Christianity and the Spiritual Life of the Ancient World** (3) Wallace
Rise and development of Christianity in relation to the culture, philosophy, mystery religions, and general religious life of the Graeco-Roman world to A.D. 500.

144 **Medieval Faith and Symbolism** (3) Wallace
Christian life and thought in the Middle Ages: mystics, saints, popes, and philosophers.

145 **Religious Currents in the Renaissance and Reformation** (3) Wallace
Transformation of Western man's understanding of his identity and destiny from the end of the Middle Ages to the Age of Reason. (Fall)

146 **Christianity in the Modern World** (3) Wallace
Changing religious styles and patterns since the Age of Reason as seen in theology, literature, political life, and religious institutions.

157 **Indian Philosophy and Mysticism** (3) Hiltebeitel
Indian speculative and mystical traditions; late Vedas, Upanishads, Bhagavad Gita, Buddhist, and Hindu soteriological systems.

158 **Ancient Indian Literature and Religion** (3) Hiltebeitel
Studies of foundational texts of Hinduism, especially *Rig Veda*, *Brahmanas*, *Mahabharata*, (including the *Bhagavad Gita*); attention to Hinduism's archaic and seminal themes.

159 **Mythologies of India** (3) Hiltebeitel
The lore of Indian gods (Vedic, Puranic), heroes (epics), and holy men (Hindu, Buddhist, Jain, Tantric); its ties with Indian caste, cult, cosmology, and spiritual ideals. (Fall)

160 **Buddhism** (3) Hiltebeitel
Origin, development, and contemporary status of Buddhist life and thought; its impact on Asian civilization. (Spring)

161 **Islam** (3)
Origin, development, and contemporary status of Islamic life and thought; its impact on the Near East. (Spring)

162 **Symbolism in the History of Religions** (3) Hiltebeitel
Religious symbolism, myth, legend, and ritual in the religions of the world; various theoretical analyses.

172 **Religion in American Culture** (3) Wallace
Growth of religious bodies and institutions in relation to American culture, development of religious thought, and analysis of the contemporary religious scene. (Fall)

174 **American Judaism** (3) Altshuler
Religious thought and institutions with emphasis on contemporary Judaism. Mythic and ritual life of American Jews, including responses to Israel, diaspora, the Holocaust, family and community life. (Spring)

181 **Woman in Western Religion** (3) Quitslund

Historical, theological, and ethical investigation of the image and role of woman in Judaism and Christianity; special consideration of the Biblical experience, the sexual qualifications for religious office, use of male-female images and languages, and contemporary issues. (Fall)

184 **The Thought of Martin Buber** (3)

Basic principles underlying the Life of Dialogue and application of those principles to all strata of life from interpersonal relationships to religious realm.

199–200 **Proseminar: Readings for the Major** (3–3) Staff

Readings and group discussions. (Academic year)

THIRD GROUP

209–10 **Seminar: Biblical Studies** (3–3) Jones

Main problems of Biblical literary, historical, and theological criticism. (Rel 210—spring)

213 **Seminar: Inter-testamental Judaism** (3) Jones

Historical and religious development of Judaism as seen in the Apocrypha, Pseudepigrapha, Dead Sea Scrolls, Philo and early Rabbinism. (Fall)

216 **Supervised Clinical Pastoral Education (I–A)** (6) Staff

Full-time program of clinical pastoral education in an approved center. Involvement in the responsibility for pastoral ministry is reviewed and evaluated in a peer-group context.

217 **Supervised Clinical Pastoral Education (I–B)** (6) Staff

Continuation of Rel 216 with emphasis on pastoral and personal identity, sustained pastoral relationships, and pastoral methods and skills.

218 **Supervised Clinical Pastoral Education (II–A)** (6) Staff

Responsibility in pastoral ministry is increased with emphasis on group work, interprofessional involvement, use of specific counseling methods, work with persons with special problems. Prerequisite: Rel 216 and 217; or equivalent.

219 **Supervised Clinical Pastoral Education (II–B)** (6) Staff

Continuation of Rel 218 with emphasis on examination and review of administrative procedures, design of pastoral programs, and development of pastoral theology.

222 **Seminar: Christian Ethics** (3) Yeide

Important tendencies in ethical reflection of the contemporary Christian Church; contributions of social sciences to that reflection.

223 **Religious and Ethical Perspectives on Medical Problems** (3)

Religious and ethical questions in medical problems and medically related issues.

Offered through the College of General Studies at Off-Campus Centers for students in the master's degree program in the field of religion and medical care.

*225 **The Dynamics of Ministering to the Young Adult** (3)
Conceptual models of development of young adults from late adolescence. special problems of educational and military experience, vocational choice, marriage and the family, and physical, intellectual, emotional and religious development. Encounter experience with persons and groups

*227–28 **Advanced Studies in Pastoral Care** (3–3)
History and present state of methodologies and conceptual models of pastoral counseling and leadership in groups; supervised work in inter-faith and multidisciplinary ministries.

235 **Seminar: Roman Catholicism in the Modern World** (3) Quitslund
Important leaders and their ideas in selected development since 1500—doctrinal, spiritual, biblical, liturgical and ecumenical. (Spring)

237 **Seminar: Theological Analysis** (3) Quitslund
Historical and topical study of the development of important ideas in such areas as Christology, soteriology and ecclesiology.

238 **Seminar: Contemporary Jewish Religious Thought** (3) Staff
Selected topics. (Spring)

241–42 **Seminar: Religious Education** (3)
Major problems in the practice of religious education.

262 **Seminar: History of Eastern Religions** (3) Hiltebeitel
Selected topics. (Fall)

271 **Seminar: American Religious History to 1830** (3) Wallace
Religious thought and life during the Colonial and early National period

273 **Seminar: American Religious History since 1830** (3) Wallace (Fall)
Religious thought and life from the Civil War to the present. Staff

291–92 **Readings and Research** (3–3)
Investigation of special problems. (Academic year) Staff

299–300 **Thesis Research** (3–3)
(Fall and spring)

Romance Languages and Literatures

Professors J.W. Robb, G.E. Mazzeo, J.A. Frey, J.L. Métivier, Jr., J.F. Burke (*Chairman*)
Associate Professors M.A.B. Coffland, P.G. Sáenz, G. Ludlow
Assistant Professors E.S. Neyman, G.P. Huvé, J.E. Hicks, S.R. Barnett, I. Azar, J.M. Thibault, J.M. Tubbs

* Offered through the College of General Studies at Off-Campus Centers for students in the degree program in the field of religion and medical care.

Bachelor of Arts with a major in (1) *French Language and Literature*, (2) *Spanish-American Literature*, (3) *Spanish Language and Literature*, *or* (4) *any approved combination selected from two of the preceding* (*1*), (*2*), (*3*), *fields* (*Field-of-Study*).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Fren 1–2, 3–4, 9–10, or equivalent; or Span 1–2, 3–4, 9–10, or equivalent.

3. Required introductory literature courses—Fren 51–52 or 91–92, or Span 51–52 or 91–92.

4. Required for the major:

There is no specific program of required courses. The student, however, is expected to demonstrate a knowledge of his or her field in breadth and depth either by the passing of a comprehensive examination at the end of the senior year, or by undertaking and satisfactorily completing a comprehensive project during the course of the senior year. A proseminar is required as follows: Fren 199–200 for French language and literature majors; Span 199–200 for Spanish language and literature majors; Span 197–98 for Spanish-American literature majors.

Master of Arts in the fields of (1) *French Literature*, (2) *Spanish American Literature*, and (3) *Spanish Literature*.—Prerequisite: the degree of Bachelor of Arts in the appropriate field from this University, or an equivalent degree.

Required: the general requirements, pages 95–102. The program of study consists of 24 semester hours of approved course work plus a thesis (equivalent to six semester hours), or with the approval of the department a student may elect a program of study consisting of 36 semester hours of approved coursework without a thesis.

Doctor of Philosophy fields of study in Romance Literatures.—Required: the general requirements, pages 95–97, 102–104. There are four fields: French literature; Spanish literature; Spanish-American literature; and any approved combination of French, Spanish or Spanish-American literature.

Bachelor of Arts in Education with teaching fields in French and in Spanish.—Prerequisite: the education curriculum, pages 81–82.

Required: the French option or the Spanish option and the professional courses listed on pages 120, 125, 126.

Placement Examinations: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

FRENCH

Departmental prerequisite: Fren 3–4 or 6, or equivalent, is prerequisite to all second group courses in French, except for courses offered in English translation.

First Group

1–2 **First-year French** (3–3) Tubbs and Staff

A year course: credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunciation, conversation, grammar,

composition, reading of modern French prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Fren 1 and 2—fall and spring)

3–4 **Second-year French** (3–3) Thibault and Staff

A year course: credit toward a degree at this University given on completion of Fren 4. Conversation, grammar, composition, reading in modern French prose. Aural training, oral practice in language laboratory. Prerequisite: Fren 1–2 or two years of high school French. Laboratory fee $17.50 a semester. (Fren 3 and 4—fall and spring)

6 **Second-year French** (6) Thibault and Staff

Lecture (3 hours), discussion (3 hours). Intensive course which covers material of Fren 3–4. Grammar review, reading, conversation. Prerequisite: two years of high school French with grades of *B* or better; Fren 2. Laboratory fee, $17.50 a semester. (Spring)

9 **Expression orale du francais contemporain** (3) Huvé and Staff

Emphasis on conversation in a controlled situation. Special attention to the acquisition and active use of a flexible vocabulary. Oral reports. Prerequisite: Fren 3–4 or equivalent. (Fall and spring)

10 **Cours de Syntaxe** (3) Huvé and Staff

Grammar, writing of exercises, compositions, and translation. Analysis of vocabulary and syntax and their effects in samples of writing. Prerequisite: Fren 3–4 or equivalent. (Fall and spring)

12 **French Conversation and Composition (Intensive)** (6) Huvé and Staff

Intensive course which covers material of Fren 9 and 10. Laboratory fee $25.

49 **French for Graduate Students** (0) Staff

For graduate students preparing for reading examinations. No academic credit. Total fee, $309 (tuition, $294; University Center fee, $15). (Fall and spring)

51–52 **Survey of French Literature** (3–3) Métivier and Staff

Readings in French literature from the Middle Ages to the present. Lectures, readings, recitations, and informal discussions. (Fren 51 and 52—fall and spring)

60 **Contemporary French Civilization** (3) Ludlow

Study of contemporary France as seen through its cultural, political, economic and social life, its geography, language, population and character. Class lectures and discussion of texts supplemented by slides, films, tapes and records. Conducted in English.

91–92 **Analyse de texte** (3–3) Thibault

Methodology and vocabulary of literary criticism; application of principles of *explication de texte* to selections from prose, drama, and poetry from the Renaissance to the present. (Academic year)

Second Group

103 **Diction, Phonétique appliquée** (3) — Huvé

The sound of French; elements of articulatory phonetics. Exercises in reading and speech with attention to pronunciation, accent, rhythm, and intonation. (Fall)

108 **Cours de grammaire avancée** (3) — Thibault

(Spring)

109 **La Langue pratique** (3) — Huvé and Staff

Advanced level study. Practical and everyday vocabularies developed through systematic drills of syntactical patterns. (Fall and spring)

110 **Cours de stylistique** (3) — Huvé and Staff

Advanced study of vocabulary (usage, shades of meaning, psychological value, sound value, shifts in meaning) and sentences (clauses, relationships between clauses, their possible transformations); emphasis on stylistic techniques. (Fall and spring)

119–20 **French Literature of the Middle Ages and the Renaissance** (3–3) — Métivier

Literary history and the development of ideas. *Les chansons de geste*, courtly literature, satire, the theatre, lyric and didactic poetry; Rabelais, Montaigne, La Pléiade. Class analysis of texts, collateral readings.

121–22 **17th Century French Literature** (3–3) — Burks

Drama, fiction, poetry, criticism and philosophy in the Age of Classicism. (Academic year)

123–24 **18th Century French Literature** (3–3) — Ludlow

History, philosophy, criticism, letters, drama, fiction, poetry, the "salons," idea of progress, idea of science. Class analysis of texts, collateral reading.

125–26 **19th Century French Literature** (3–3) — Frey, Thibault

Poetry, drama, and novel of the 19th century; emphasis on stylistic analysis. Offered in French, 1977–78 and alternate years; offered in English translation, 1976–77 and alternate years. (Academic year)

127–28 **20th Century French Literature** (3–3) — Coffland, Thibault

Fiction, poetry, and drama from 1900 to present. Chronological examination of authors, movements. Offered in English translation, 1977–78 and alternate years; offered in French, 1976–77 and alternate years. (Academic year)

130 **From Cubism to Surrealism: Correspondences between Art and Literature** (3) — Coffland

Expression of common preoccupations in diverse media. Readings, slides, lectures and informal discussions.

133 **Seminar: French Literature** (3) — Staff

May be repeated for credit. Topic to be announced in the *Schedules of Classes*. (Summer)

151 **Cinema and Literature—in English** (3) Thibault
Topic for 1976: surrealism. Interaction between the film and literature. Aesthetic theories of the surrealists and their applications to the film and literary genres. Selected films and readings. May be repeated for credit. (Summer)

199–200 **Proseminar: Readings for the Major** (3–3) Staff
Conferences and group discussions. (Academic year)

Third Group

202 **Thème et Version** (3) Ludlow
Limited to students in the Graduate School of Arts and Sciences; open to others only by permission of the graduate adviser. Required of all graduate students in the field of French Language and Literature. Analysis and translation of selected prose passages, alternating between French and English; designed to teach students to write with precision and clarity. (Fall)

213–14 **Medieval French Literature** (3–3) Staff
French literature to the end of the Middle Ages. Prerequisite: a second-group course in French literature.

221 **Special Problems in 16th Century French Literature** (3) Burks
May be repeated for credit.

226 **16th and 17th Century Philosophical Literature** (3) Burks
The emergence of a literature of ideas; emphasis on the thought of Calvin, Montaigne, Descartes, and Pascal.

229–30 **Literary Renaissance in Europe** (3–3) Burks
Study of the developments in the poetry of Italy, France, and England.

231–32 **Theatre in the 17th Century** (3–3) Staff
Survey of the development of theatrical arts and the drama. Research papers and reports. (Academic year)

234 **17th Century Nondramatic Literature** (3) Staff
Rationalism and the revolt against authority expressed in literature. Impact of nondramatic literature on the development of classical doctrine.

241 **The Rationalistic Current in the 18th Century** (3) Ludlow
The contribution of the *philosophes* to the intellectual evolution of France and Europe.

242 **Seminar: the French Novel and Theater in the 18th Century** (3) Ludlow

244 **Special Problems in 18th Century French Literature** (3) Frey
May be repeated for credit. Topic for 1977: Rousseau.

253 **Special Problems in 19th Century French Literature** (3) (Fall) Frey
May be repeated for credit. Topic for 1976: Flaubert.

256 **19th Century French Literature** (3)

258 **Special Problems in 19th Century French Poetry** (3) Frey
May be repeated for credit.

264 **Seminar: Modern Period** (3) Coffland
Topic: the novel. May be repeated for credit. (Fall and spring)

265 **20th Century French Theatre** (3) Coffland

266 **20th Century French Poetry** (3) Coffland
Background and development of poetry in the 20th century; *explication de texte* approach.

295 **Independent Reading and Research in French Literature** (arr.)
For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Fourth Group

George Washington University is a member of the Folger Institute of Renaissance and 18th-century Studies. The policies of the Institute are set by a central committee on which each member institution is represented. Doctoral students enrolled at one of the Institute seminars are eligible to apply for fellowship aid. Folger Institute Seminars are numbered 301 through 309. Seminar titles for the 1976–77 academic year are listed below. Students wishing to register for these courses should consult the Chairman of the Department of Romance Languages and Literatures

301 **English Renaissance Poetry: the Establishment of the Forms** (3) Weismiller
(Fall)

302 **English Renaissance Palaeography** (3) Staff
(Spring)

303 **Petrarch and Sonnet Sequences** (3) Staff
(Fall)

304 **Literary Change in 18th Century British Literature** Staff
(Spring)

305 **Folger Institute Seminar** (3) Staff
Topic will be announced. (Fall)

306 **Folger Institute Seminar** (3) Staff
Topic will be announced. (Spring)

307 **Folger Institute Seminar** (3) Staff
Topic will be announced. (Fall)

308 **Folger Institute Seminar** (3) Staff
Topic will be announced. (Spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ITALIAN

First Group

1–2 **First-year Italian** (3–3) Coffland and Staff
A year course: credit toward a degree at this University given on completion of Ital 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Italian prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Academic year)

3–4 **Second-year Italian** (3–3) Coffland and Staff
A year course: credit toward a degree at this University given on completion of Ital 4. Conversation, grammar, composition, reading of modern Italian prose, introduction to Italian civilization. Aural training, oral practice in language laboratory. Prerequisite: Ital 1–2 or two years of high school Italian. Laboratory fee, $17.50 a semester. (Academic year)

9–10 **Italian Conversation and Composition** (3–3) Coffland (Academic year)
Prerequisite: Ital 4 or equivalent and permission of instructor.

Third Group

295 **Independent Reading and Research in Italian Literature** (arr.)
For students preparing for the Master of Arts or Doctor of Philosophy degree. May be repeated for credit. (Fall and spring)

PORTUGUESE

First Group

31–32 **Intensive Portuguese** (3–3) Robb (Academic year)
Prerequisite: knowledge of one other Romance language.

SPANISH

Departmental prerequisite: Span 3–4 or 6, or equivalent, is prerequisite to all second group courses in Spanish except for courses offered in English translation.

First Group

1–2 **First-year Spanish** (3–3) Azar and Staff
A year course: credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar,

composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Span 1 and 2—fall and spring)

3–4 **Second-year Spanish** (3–3) Barnett and Staff

A year course: credit toward a degree at this University given on completion of Span 4. Conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Prerequisite: Span 1–2 or two years of high school Spanish. Laboratory fee, $17.50 a semester. (Span 3 and 4—fall and spring)

6 **Second-year Spanish** (6) Neyman

Lecture (3 hours), discussion (3 hours). Intensive, accelerated course which covers material of Span 3–4. Grammar review, reading, conversation. Prerequisite: two years of high school Spanish with grades of *B* or better, or grade of *A* or *B* in Span 2. Laboratory fee, $17.50 a semester. (Spring)

9–10 **Spanish Conversation and Composition** (3–3) Hicks and Staff

Prerequisite: Span 4 or equivalent and permission of instructor. Students who receive credit for Span 9 cannot receive credit for Span 19. (Span 9 and 10—fall and spring)

12 **Spanish Conversation and Composition (Intensive)** (6) Staff

Intensive, accelerated course which covers the material of Span 9–10. Laboratory fee, $25.

19 **Community Spanish** (3) Barnett

Spanish conversation; emphasis on developing linguistic skills necessary for working with the Spanish-speaking community. Class work supplemented by work-study program with social agencies within the Spanish-speaking community. Admission by permission of instructor. Students who receive credit for Span 19 cannot receive credit for Span 9.

20 **Prensa y Cultura: Intensive Spanish Conversation** (3) Azar

Intensive conversation organized around specific contemporary topics; illustrated by periodical material, films and interviews.

49 **Spanish for Graduate Students** (0) Hicks

For graduate students preparing for reading examinations. No academic credit. Total fee, $309 (tuition, $294; University Center fee, $15). (Fall and spring)

51–52 **Survey of Spanish Literature and Civilization** (3–3) Barnett

Social, artistic, and cultural background of Spanish literature. Lectures, readings, recitations, and informal discussions. (Academic year)

91–92 **Explicacion de textos** (3–3) Sáenz

Analytical introduction to Spanish and Spanish American literature. Method demonstrated and practiced on selected passages. (Academic year)

Second Group

109–10 **Advanced Spanish Conversation and Composition** (3–3) Mazzeo

Development of writing and speaking skills. Emphasis on diction and

style. Prerequisite: Span 10 or equivalent and permission of instructor. (Academic year)

119–20 **Medieval Spanish Literature** (3–3) Azaí
Survey by genre of the literature of the Middle Ages. (Academic year

121–22 **Spanish Literature of the Golden Age** (3–3) Azaí
Span 121: Renaissance and Baroque Spanish poetry, the Spanish *comedia*.
Span 122: narrative prose of the Golden Age.

123–24 **Cervantes: Don Quijote** (3–3) Azaí
The *Quijote* and the novel as a literary genre: reality and fiction. (Academic year)

125–26 **Modern Spanish Literature** (3–3) Mazzeo
Prose, poetry, and drama of the 18th and 19th centuries. Class analysis of texts, collateral reading, lectures on literature and history. (Academic year)

127–28 **Contemporary Spanish Literature** (3–3) Sáenz
Prose, poetry, and drama of the 20th century. Class analysis of texts, collateral reading, lectures on literature and history.

130 **The Modern Spanish Essay** (3) Mazzeo
Development of the Spanish essay from the 16th through the 20th centuries; emphasis on the 18th and 19th centuries. Class analysis of texts, collateral reading and lectures.

131 **The Generation of 1898** (3) Staff
Study of the various critical problems related to this renaissance of Spanish letters as a whole, and of its most representative figures and works.

133 **Feminist Authors in Hispanic Literature** (3) Mazzeo
Development of feminist themes in Hispanic literature. Class analysis of representative works with readings in Spanish or in English translation.

137 **The Spanish Civil War and the Creative Artist** (3) Barnett
Historical and literary study of the Spanish Civil War and the subsequent artistic reaction in Spain, Great Britain, France and the U. S. Taught in English with readings in Spanish, English or French.

141 **New Spanish-American Narrative** (3) Staff
Short stories of Borges, Cortázar, Fuentes, Arreola, Carpentier, García Márquez. Texts in Spanish. Commentary in English or Spanish.

151–52 **The Spanish-American Novel** (3–3) Robb
Development of the novel in Spanish America. Lectures, collateral reading, and class analysis of texts.

155–56 **Spanish-American Literature to 1880** (3–3) Robb
Literature of Spanish America from the colonial period to the latter part of the 19th century. Lectures, collateral reading, reports, and class analysis of important works.

157–58 **Spanish-American Literature since 1880** (3–3) Robb

Literature of Spanish America from 1880 to the contemporary period. Lectures, collateral reading, reports, and class analysis of important works. (Academic year)

193 **Curso de estilo** (3) Staff

Advanced grammar, composition, and stylistics. Open to both advanced undergraduate and graduate students. Recommended for majors and teachers of Spanish. (Fall)

197–98 **Proseminar: Readings for the Major in Spanish-American Literature** (3–3) Robb

Recommended for all majors. Conferences and group discussions. (Academic year)

199–200 **Proseminar: Readings for the Major in Spanish Language and Literature** (3–3) Barnett

Recommended for all majors. Conferences and group discussions. (Academic year)

Third Group

215 **Old Spanish Language and Literature** (3) Staff

221 **Seminar: Cervantes' "Don Quijote"** (3) Azar

Cervantes' literary theories, the *Quijote* and its relations with the other *novelas cervantinas* as different modes of representing reality in literary fiction. (Fall)

224 **Seminar: Special Problems in Spanish Renaissance Literature** (3) Azar

May be repeated for credit. Topic for 1977: *La Celestina.* (Spring)

225 **Seminar: Special Problems in Golden Age Literature** (3) Azar

231 **Seminar: 18th Century Spanish Writers** (3) Mazzeo

Lectures and analysis of principal authors and works; relationships with subsequent literary movements.

242 **Seminar: Spanish Romanticism** (3) Mazzeo

Lectures and analysis of principal authors and works. Collateral readings. Problems of origins and developments.

244 **Seminar: Naturalism and the Spanish Novel** (3) Mazzeo

Development of Naturalism in 19th century Spain. Analysis of representative works of Pardo Bazán, Clarín, Blasco-Ibáñez and others. (Fall)

246 **Seminar: Works of Galdó** (3) Barnett

Ideological and stylistic analysis: relationship of Galdós' works to literary movements of the second half of the 19th century. (Spring)

248 **Seminar: Spanish Lyric Poetry of the 20th Century** (3) Sáenz
Stylistic analysis of the most significant poets from 1898 to the present. (Spring)

250 **Seminar: Novecentismo y Literatura de Entreguerras** (3) Sáenz
The prose writers: intellectualism and new forms of expression.

251 **Seminar: Works of Unamuno and Ortega y Gasset** (3) Sáenz
Study of the thought of Unamuno and Ortega y Gasset; analysis and commentary on the texts.

252 **Spanish Literature since the Civil War** (3) Sáenz
Development of the Spanish novel since 1939. (Fall)

253 **Seminar: Studies in Modern Spanish-American Poetry** (3) Robb

255 **Seminar: Studies in 20th Century Spanish-American Theater** (3) Robb

256 **Seminar: Studies in Mexican Narrative Prose** (3) Robb

261 **Seminar: Studies in the Spanish-American Short Story and Essay** (3) Robb
The Spanish American short story and essay as artistic forms; selected modern short story writers and essayists. May be repeated for credit. (Fall)

264 **Seminar: Studies in Recent Spanish-American Fiction** (3) Robb

266 **Seminar: Alfonso Reyes** (3) Robb
Alfonso Reyes, the essayist-artist, poet, and complete humanist, as studied in his various prose and poetic works. (Spring)

287 **Seminar: Problems in Latin-American Civilization** (3) Staff
Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

295 **Independent Reading and Research in Spanish and Spanish-American Literature** (arr.) Staff
For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

Fourth Group Staff

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Sanskrit

See "Germanic Languages and Literatures."

Scandinavian

See "Germanic Languages and Literatures."

Serbo-Croatian

See "Slavic Languages and Literatures."

Service-Learning Program*

Professor C.C. Mondale
Associate Professor M. McCally
Assistant Professors H. Nashman, N.C. Garner
Lecturer G.H. Williams

SERVICE-LEARNING EXPERIMENTAL HUMANITIES

Second Group

151 **Urban Legal Services** (6) Williams

Field work and academic study of the urban legal system. Role of urban legal system in promoting humanistic values and enhancing social change. Admission by permission of instructor. (Fall and spring)

152 **Human Resource Issues in Education** (6) Nashman

Exploration of the effects of education on society and vice versa; opportunities for experience, study, and service in public, private, museum, hospital, and community education centers. Admission by permission of instructor. (Fall and spring)

153 **Issues in American Health Care** (6) McCally

Field work combined with academic study of present American health care system and its problems: cost, quality of care, delivery of health care, ethical issues, health education, consumer issues, etc. Field placements (12–20 hours a week) in appropriate health-related activities. Admission by permission of instructor. (Fall and spring)

* Administered by the Division of Experimental Programs

154 **Independent Study** (6) Mondale

Field work combined with academic study, involving field-placements (12-20 hours a week) and complementary academic program of study under the supervision of an appropriate faculty member. Students must "contract" with the agency, the faculty member and the Service-Learning Program. Admission by permission of instructor. (Fall and spring)

155 **The Arts and their Audiences** (6) Garner

Studies in the purpose and operation of the arts organizations in Washington. Weekly seminars and placement in an internship in an arts organization. Discussion topics focus on the process of communication between artists and the public, the government and the business community. Open to students with a demonstrated interest in the arts and the maturity to perform in a responsible position in an arts organization. (Fall and spring)

SERVICE-LEARNING POLITICAL SCIENCE

Second Group

154 **Law and Social Change** (6) Williams*

Study of the legal system and its role in promoting social change. Readings, group discussions, and work with lawyers and 3rd-year law students. (Fall and spring)

155 **American Political Behavior** (6) Staff

Internship in a variety of lobbying groups. Analysis of the structural and behavioral limitations which confront those who wish to exercise political influence. (Fall and spring)

Sino-Soviet Studies

See "Institute for Sino-Soviet Studies."

Slavic Languages and Literatures

Professor H.B. Yakobson
Associate Professors N.N. Natov, C.A. Moser, G.A. Olkhovsky (*Chairman*), W.W. Rowe, I. Thompson
Associate Professorial Lecturer J. Jelagin
Adjunct Assistant Professor M.F. Miller
Lecturers S.M. Bickel, S. Ficks

Bachelor of Arts with a major in Russian Language and Literature (Field-of-Study or *Departmental).*—The following requirements must be fulfilled.

1. The general requirements as stated on pages 77–78, 85–91.

* Gregory Howard Williams is Lecturer in Law in the National Law Center.

Prerequisite courses—Slav 5 6 (preferred), or Slav 1-2, 3-4; or equivalent; Slav 91 92.

Required for the major.

Field of Study major—By the end of the senior year the student will be expected ave a reasonable command of language skills and a grasp of the fundamentals of an structure, as well as a good foundation in Russian literature and culture. passing of a major examination during the senior year is required. The depart- provides a proseminar to assist the student in preparation for the major nation.

Departmental major—from 30 to 36 semester hours of course work in the De- ent of Slavic Languages and Literatures distributed as follows: Language— 15 hours chosen from Slav 9 10, 101, 103, 104, 109 10, 198; Culture and Civili- on—six hours chosen from Slav 71, 161–62, 172; Literature in Russian—six hours sen from Slav 141 42, 146, 151–52; Literature in English Translation—six to nine s chosen from second-group courses.

student who is already proficient in Russian language or literature may, upon ng an appropriate examination, waive any or all of the first-group language or re courses, as well as up to six semester hours of second-group courses.

helor of Arts with a major in Russian Literature and Culture- in Translation d-Studv).—The following requirements must be fulfilled.

The general requirements as stated on pages 77–78, 85–91.

Prerequisite courses—Slav 47 and 49, or Slav 1-2 and 3 4, or equivalent; and 91–92.

By the end of the senior year the student will be expected to have a good of Russian literature and the principles of literary criticism, as well as a al knowledge of Russian culture and history. The passing of a major examina- laring the senior year is required. The department provides a proseminar to the student in preparation for the major examination.

student who is already proficient in Russian language or literature may, upon ng an appropriate examination, waive any or all of the first-group language or ure courses, as well as up to six semester hours of second-group courses.

ter of Arts in the field of Russian Language and Literature.- Two areas of entration are offered: Russian language and literature and Russian language and stics

requisite: the degree of Bachelor of Arts with a major in Russian language literature or Russian literature and culture—in translation from this Univer- or an equivalent degree. A student planning a concentration in Russian lan- and literature must have a general proficiency in the Russian language, a al knowledge of Russian literature and an acquaintance with Russian history culture. A student planning a concentration in Russian language and linguistics have a general proficiency in the Russian language, a general knowledge of its ure and an acquaintance with general linguistics.

ired the general requirements, pages 95–102. The program of study con- 24 semester hours of approved course work plus a thesis (equivalent to six ster hours) or 30 semester hours of approved course work without a thesis. dates electing the Russian language and literature concentration must include six r hours of linguistics and at least 18 hours of literature; candidates electing an language and linguistics concentration must include six semester hours of e and at least 18 hours of language and linguistics. All candidates must pass ing knowledge examination in either French or German and must pass a Comprehensive Examination.

helor of Arts in Education with a teaching field in Russian.—Prerequisite: the n curriculum, pages 81–82.

ted the Russian option and the professional courses listed on pages 124, 126.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination assignment is made to the appropriate course.

FIRST GROUP

1–2 **First-year Russian** (3–3) Yakobson and Staff

Beginners' course in fundamentals of grammar and pronunciation. Slav 1 is prerequisite to Slav 2. Laboratory fee, $17.50 a semester. (Slav 1 and 2—fall and spring)

3–4 **Second-year Russian** (3–3) Yakobson and Staff

Intermediate course in Russian language. Prerequisite to Slav 3: Slav 1–2 or two years of high school Russian. Prerequisite to Slav 4: Slav 3. Laboratory fee, $17.50 a semester. (Academic year)

5–6 **Intensive Beginning Russian** (6–6) Thompson and Staff

Classroom (6 hours), laboratory (1 hour). Beginners' intensive course in the fundamentals of Russian. Prerequisite to Slav 6: Slav 2 or 5. Laboratory fee, $17.50 a semester. (Academic year)

9–10 **Intermediate Russian Conversation and Composition** (3–3) Yakobson

Listening comprehension; oral and written practice. Prerequisite: Slav 4 or 6, or permission of instructor. (Academic year)

31–32 **Elementary Polish** (3–3) Staff

Beginners' course in the fundamentals of grammar and pronunciation. Prerequisite to Slav 32: Slav 31 or equivalent. Laboratory fee, $17.50 a semester. Offered if enrollment is sufficient.

41–42 **Elementary Serbo-Croatian** (3–3) Staff

Beginners' course in the fundamentals of grammar and pronunciation. Prerequisite to Slav 42: Slav 41 or equivalent. Offered if enrollment is sufficient.

47 **Beginning Russian for Reading** (3) Miller

For undergraduate and graduate students with little or no Russian who wish to acquire a reading knowledge of the language. No academic credit for graduate students. (Fall)

49 **Russian Reading** (3) Miller

Primarily for graduate students preparing for reading examinations. No academic credit for graduate students. Prerequisite: Slav 47 or equivalent. (Spring)

51–52 **Elementary Bulgarian** (3–3) Meyer

Beginners' course in fundamentals of grammar and pronunciation. Prerequisite to Slav 52: Slav 51 or equivalent. Offered if enrollment is sufficient.

71 **Introduction to Russian Civilization** (3) Olkhovsky

Survey of Russia's artistic, social, and cultural development. Lectures, discussion, visual aids—in English. (Fall)

91–92 **Introduction to Russian Literature** (3–3) Moser

Emergence and development of Russian literature and ideas during the 19th and early 20th centuries—in English. (Academic year)

SECOND GROUP

101 **Readings in the Soviet Press** (3) Staff

Representative reading and translation of Soviet periodicals and current publications in social sciences. Prerequisite: Slav 4, 6, 49, or permission of instructor. (Fall)

103 **Scientific Russian** (3) Staff

Representative readings in the major fields of Russian contemporary scientific literature. Prerequisite: Slav 4, 6, 49, or permission of instructor. (Spring, even years)

104 **Business Russian** (3) Staff

Study of Russian business vocabulary and concepts of business in the Soviet context. Prerequisite: Slav 4, 6, 49, or permission of instructor. (Spring, odd years)

109–10 **Advanced Russian Conversation and Composition** (3–3) Yakobson

Developing proficiency in oral and written expression. Prerequisite: Slav 10 or equivalent. (Academic year)

128 **Dostoevsky, the Man and the Artist** (3) Natov

Sources and development of Dostoevsky's philosophical, religious, and aesthetic ideas. His influence on Russian and Western literature. Lectures, discussions, and reports—in English. (Fall)

141–42 **19th Century Russian Literature** (3–3) Staff

Major Russian writers and literary trends from the end of the 18th century to Chekhov; fiction, poetry, drama—in Russian. Prerequisite: Slav 4 or 6, or equivalent. (Academic year 1976-77 and alternate years)

143–44 **The Russian Novel** (3–3) Moser

Study of representative novels of the 19th and 20th centuries—in English. (Academic year 1977-78 and alternate years)

146 **The Russian Short Story** (3) Natov

Historical development of the Russian short story. Lectures, reports, and class analysis—in Russian. (Spring, odd years)

151–52 **20th Century Russian Literature** (3–3) Natov

Various trends in Russian literature since the beginning of the 20th century. Masterpieces of Russian poetry, prose, and drama—in Russian. Prerequisite: Slav 4 or 6, or equivalent. (Academic year 1977-78 and alternate years)

153 **Turgenev** (3) Moser

Reading and discussion of Turgenev's works. Emphasis on the novels; major short stories analyzed and some time spent on his plays and other prose works—in English. (Fall, odd years)

156 **Leo Tolstoy, His Life and Works** (3)
Evolution of Tolstoy's artistic and philosophical ideas. Tolstoy's impa
on Russian literature and society. Lectures, reports, and classroom anal
sis of his major works—in English. (Spring)

157 **Nabokov** (3)
Reading and discussion of the major creative works. Russian roots, orde
ing of reality, sexual symbolism—in English. (Fall)

158 **Solzhenitsyn** (3)
Reading and discussion of the most important stories, novels, and pl
by the outstanding contemporary Russian writer—in English. (Spr
even years)

161–62 **Russian Culture** (3–3)
Survey of Russian cultural heritage from origins of ancient Russia to p
ent—in English. Lectures, discussion, reports. (Academic year)

165 **Soviet Literature from the Revolution to World War II** (3)
Basic themes, issues, literary figures of the Soviet 1920s. The fate of
erature and writers under increasing state control: Five-year Plan lit
ture. Lectures, discussion, reports—in English. (Fall)

166 **Soviet Literature from World War II to the Present** (3)
Literature in wartime, under Stalinism, and in the "thaws." The new g
eration of dissident liberal and "underground" literature. Lectures, d
cussion, reports—in English. (Spring)

172 **Soviet Dissent** (3)
Examination of artistic and intellectual dissent since the death of Sta
underground press, songs, plastic arts—in English. (Spring)

191 **Russian Literature to 1800** (3)
Survey of Russian literature from the earliest times to the end of the 1
century—in English.

193–94 **The Other Slavs: Their Literature—in English** (3–3)
An examination of non-Russian Slavic literatures from their beginning
the present day. Emphasis on themes, ideas, and styles peculiar to
literature. (Academic year)

197 **Methodology of Teaching Russian** (3)
Discussion of methods, examination of textbooks, observation of
room procedures. Prerequisite: 18 semester hours of Russian lang
(Fall, even years)

198 **Russian Stylistics** (3)
Development of the Russian language, literary styles, and techn
words and their aesthetic value, phraseological units, word order,
structure. (Spring, odd years)

199–200 **Proseminar: Readings for the Major** (3–3)
Conferences and group discussions. (Academic year)

THIRD GROUP

213 **Russian Linguistic Structure I: Phonology and Morphology** (3) Thompson
(*Formerly Slav 185*)

Linguistic description of the phonology and morphology of standard contemporary Russian.

214 **Russian Linguistic Structure II: Syntax, Lexicon, and Semantics** (3) Thompson
(*Formerly Slav 186*)

Linguistic description of the syntax, lexicon, and semantics of standard contemporary Russian. (Spring)

215 **History of the Russian Language** (3) Thompson

Historical phonology, morphology, and syntax of the Russian language. (Fall, odd years)

216 **Comparative Slavic Structure** (3) Thompson

Study of the structure of Slavic languages other than Russian. Knowledge of a Slavic language other than Russian is helpful, but not required. (Spring, even years)

225 **Pushkin and the Poets of His Time** (3) Natov

Pushkin's predecessors; Pushkin's lyrics and dramas. Lermontov—the heir to Pushkin's poetic tradition. (Fall, odd years)

253 **Seminar: Literary Criticism** (3) Natov

Study of leading Russian critics and their role in the development of Russian literature; the emergence of various literary schools. (Spring, even years)

254 **Seminar: Literary and Intellectual Currents of the 1860s** (3) Moser

Discussion of literary and intellectual developments in the Russia of the 1860s. Reading knowledge of Russian required. (Spring, odd years)

255 **Seminar: Main Trends in 20th Century Russian Literature** (3) Natov

Study of representative works since 1900; their artistic and social value—in Russian. (Fall, even years)

295 **Independent Reading and Research** (arr.) Staff

For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

Sociology

Professors R.W. Stephens, I.H. Cisin, R.G. Brown, T.F. Courtless, Jr. (*Chairman*)
Associate Professors P.H.M. Lengermann, R.A. Wallace
Assistant Professors P.L. Stewart, J.L. Tropea, M.E. Boeckmann
Adjunct Assistant Professor E.R. Zeitz
Assistant Professorial Lecturer W.R. Throckmorton

Bachelor of Arts with a major in Sociology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students must consult the departmental adviser regarding course to be taken in satisfying the requirement for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.)
2. Prerequisite course—Soc 1.
3. Required courses in related areas—12 semester hours in *one* of the following related social science fields: anthropology, economics, geography, history, political science and psychology.
4. Required courses in the major—Soc 101, 140–41, 149; 15 additional semester hours in second-group sociology courses.

Master of Arts in the field of Sociology.—Prerequisite: a bachelor's degree with a major in sociology or in an approved related field. Applicants should present scores on the Graduate Record Examination, especially in the Verbal and the Quantitative Tests, and arrange for former professors to write letters of reference to the Graduate School of Arts and Sciences.

Required: the general requirements, pages 95–102. With the approval of the adviser and of the Graduate Education Committee, students may elect one of the following programs: (1) at least 24 semester hours of graduate work plus a thesis (equivalent to six semester hours), satisfactory completion of a Master's Comprehensive Examination in sociological theory and social research methods and an oral defense of the thesis; or (2) at least 33 semester hours of graduate coursework and satisfactory completion of a Master's Comprehensive Examination in sociological theory, social research methods and one substantive special field (deviant behavior, political sociology, sociology of work, urban sociology or sociology and social policy).

In addition to the hours specified above, all candidates must satisfactorily complete Stat 105 or its equivalent. All candidates must select from the graduate sociology courses as follows: six hours chosen from sociological theory (Soc 333 and 239 recommended), six hours chosen from social research methods and six hours chosen from one special area (deviant behavior, political sociology, sociology of work, urban sociology or sociology and social policy). Candidates must also fulfill the tool requirement by passing a reading knowledge examination in one foreign language or by satisfactorily completing the tool requirement in either statistics or computer programming.

Doctor of Philosophy in the field of Sociology.—Required: the general requirements, pages 95–97, 102–104. Students must complete from 30 to 36 semester hours of graduate coursework, and from 12 to 18 semester hours of dissertation research, for a total of 48 hours beyond the master's degree. Students must include in their program of study graduate coursework in each of the following: six semester hours of sociological theory (including Soc 333), six hours of social research methods and six hours each in two substantive specialties, at least one of which must be chosen from among those offered by the department of sociology—deviant behavior, political sociology, sociology of work and urban sociology. Students must satisfactorily complete the General Examination in sociological theory

ocial research methods and two substantive specialties. Students must also fulfill e tool requirement by passing a reading knowledge examination in one foreign anguage and by satisfactorily completing the tool requirement in either statistics computer programming.

Departmental prerequisite: Soc 1 is prerequisite to all second- and third-group ourses in Sociology except for Soc 181 and 191.

FIRST GROUP

1 Introductory Sociology (3) — Staff

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior. (Fall and spring)

2 Major Social Issues (3) — Staff

(Formerly Uses of Sociology)

Critical examination of selected major social issues confronting American society. Topics change each semester. May be repeated once for credit. Prerequisite: Soc 1. (Fall and spring)

SECOND GROUP

101 Development of Social Thought (3) — Lengermann, Stephens

Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century. Prerequisite: Soc 1. (Fall and spring)

110 The Sociology of Work (3) — Brown

Introductory survey of industrial sociology; sociology of occupations and professions; industry-community relations; and analysis of large, complex organizations. (Fall)

124 Medical Sociology (3) — Brown

Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services. (Fall)

125 Sociology of Religion (3) — Wallace, Yeide

Introduction to history of the religious area of sociology; analysis of reciprocal impact of secular upon religious and religious upon secular institutions. (Fall)

126 Urban Sociology (3) — Stephens

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development. (Fall)

127 Population Problems (3) — Stewart

Composition of populations, trends in population growth and population pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control. (Fall)

128 **Urban Problems and Policies** (3) St

Seminar on urban problems and policies developed in response to the special focus on Washington, D.C.; students placed in Washingto agencies; seminar sessions devoted to social-policy analyses of their e periences. (Spring)

129 **Race and Minority Groups** (3) Wallac

Analysis of relationships between dominant and minority groups in society particularly in the United States; nature and range of problems; analys of the phenomenon of prejudice. (Spring)

130 **Class, Status, and Power** (3) Stephen

Analysis of distribution of resources and opportunities for participation education, and social mobility in American society; international com parisons; analysis of public policies which affect these distributions (Fall)

132 **Political Sociology** (3) Lengerman

Analysis of problems involved in the study of power relations in society distribution of power in society; types and processes of government political participation and political mobilization. (Fall)

133 **Sociology of Education** (3) Tropea, Wallac

Analysis of educational systems from institutional perspectives and a agencies of socialization; relationships of education in general to society including technological, communal, and subcultural components. (Spring)

135 **Juvenile Delinquency** (3) Courtless, Tropea

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders. (Spring)

136 **Criminology** (3) Courtless, Tropea

Nature and distribution of crime as related to the development and opera tion of criminal law and various social and legal institutions in urban society. (Fall)

137 **Sociology of Law** (3) Courtless

Law as a social phenomenon and agency of social control. Problems of legal concepts, doctrines and institutions. (Fall)

139 **Society and the Deviant** (3) Tropea

Analysis of relationships of society, socialization, and deviancy. Social re sponses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools. (Spring)

140–41 **Social Research Methods** (3–3) Boeckmann, Cisle

(Formerly Soc 141 [3])

Soc 140: introduction to basic research methods in sociology. Soc 141 (Soc advanced research methods. Prerequisite to Soc 141: Soc 140. 140 and 141—fall and spring)

143 **Social Movements** (3) Staff

General survey of the various forms of collective behavior (fads, panics

riots, social movements, etc.), and a more detailed study of the genesis, development, and decay of social movements and social revolutions. (Spring)

144 **Public Opinion and Mass Communication** (3) Cisin

Communication process with emphasis on international communications, propaganda, and mass media; measurement of propaganda campaigns. (Fall)

149 **Modern Sociological Theory** (3) Wallace

Systematic study of contemporary schools of sociological theory, both European and American development; evaluation of scientific contributions of each school. Prerequisite: Soc 101. (Fall and spring)

151 **Problems of Urban Social Systems** (9) Staff

Developing a comprehensive perspective on selected social problems through lectures and readings. Topic changes each semester. Prerequisite: 24 semester hours selected from economics, history, political science, psychology, and sociology. Admission by permission of instructor. Concurrent registration in Soc 152 required. (Fall and spring)

152 **Problems of Urban Social Systems—Supervised Field Work** (6) Staff

Accompanies Soc 151. A maximum of 24 hours a week will be spent in service-research efforts by placement in the Washington, D.C., area. Concurrent registration in Soc 151 required. (Fall and spring)

*153 **Poverty in America** (3) Staff

Exploration of social and economic causes of poverty in the United States and evaluation of anti-poverty strategies, including comprehensive welfare reform. Discussion of conflicts between sociological and economic models of behavior of low income groups.

181 **Major Social Processes** (3) Staff

Analysis and examination of various processes in society of general importance to the field of sociology, e.g., social conflict, socialization, social change, etc. Topic changes each semester; may be repeated for credit. Admission by permission of instructor. (Fall and spring)

191 **Current Emphases in Sociology** (3) Staff

Analysis and evaluation of recent developments in the general field of sociology. Topic changes each semester; may be repeated for credit. Admission by permission of instructor. (Fall and spring)

195 **Research** (3) Staff

Independent study and special projects. Open only to selected undergraduate students with promising academic records. Before a student is permitted to register for Soc 195, he must submit a written proposal of his plan of study for the approval of the Staff member of the Department who will be directing his research. (Fall and spring)

*Interdepartmental course offered by the departments of sociology and economics.

THIRD GROUP

203 **Social Organization** (3) Wallac

Introduction to sociological concepts and perspectives on society as system of institutions. Recommended for students offering sociology as supporting field. (Fall)

210 **Theoretical Foundations of Political Sociology** (3) Lengermann

Sociological theory on the relationship of politics to the wider social system. Emphasis on concepts of power, alienation, ideology, politica stability, conflict, and change. (Fall)

212 **Seminar: Political Processes** (3) Lengermann, Boeckmann

Sociological studies of political process in the United States; distribution of power; political socialization, attitudes, participation, communication social movements. Prerequisite: Soc 210. (Spring)

220 **Religious Institutions in Urban America** (3) Wallace, Yeide

Structural variety of religious institutions and patterns of interaction be tween religious and secular institutions in contemporary urban life. (Spring, odd years)

223 **Urban Sociology** (3) Staff

Sociological perspectives on urbanization and urbanism and on the de terminants of the forms and structure of the city. (Fall)

224 **Urban Life** (3) Staff

Examination of differentiation—social, cultural, areal; life styles, terri torial groupings, community participation. Prerequisite: Soc 223. (Spring)

230 **Sociological Research Methods** (3) Cisin

Systematic survey of sociological research strategies and review of the literature in this area. Recommended for students with only one under graduate course in research techniques. Prerequisite: Soc 141 or equiva lent. (Fall)

231 **Seminar: Advanced Research Methods** (3) Cisin

Intensive study and evaluation of a few sophisticated research techniques and of new developments in the methodology of social research. Pre requisite: Soc 230 or equivalent. (Spring)

232 **Seminar: Research Planning and Execution** (3) Cisin, Stewart

Clinical review of student research projects; recommended for students engaged in thesis and dissertation research. Prerequisite: Soc 230 or equivalent. (Spring)

235 **Seminar: Sociology of Education** (3) Wallace

Sociological theories on relationships between education and the economic, political, social, and cultural character of society; examination of social factors relating to such topics as educational achievement, the changing functions of educational structures, and the roles of teacher and student (Fall, even years)

238 **Seminar: Development of Sociological Theory** (3) Lengermann

Development of sociology from the early 1800s to the 1920s. Intensive analysis of the classical theoretical statements. (Fall)

239 **Seminar: Modern Sociological Theory** (3) Lengermann, Wallace

Intensive examination and evaluation of contemporary schools of sociological theory in Europe and America. Advanced analysis of theoretical perspectives. Prerequisite: Soc 238. (Spring)

240 **Sociology of Work and Occupations** (3) Stewart, Brown

Analysis of occupational roles and structures; recruitment and training; adjustment problems at various career stages; interrelationships of stratification, life styles, and work roles. (Fall)

241 **Sociology of Work and Organizations** (3) Stewart, Brown

Theory of complex organizations relative to work in industry, government, and business; examination of basic processes such as decision-making, recruitment, allocation of authority, informal organization, and interorganizational relations. (Spring)

242 **Seminar: Urban Medical Systems** (3) Brown

Sociological analysis of various problems in urban medical systems, e.g., delivery of health care services, interprofessional relationships, community health care, etc. (Spring)

252 **Seminar: Sociology and Social Policy (3)** Lengermann, Boeckmann

Concepts, theory and research which demonstrate the applicability of a sociological perspective (for example, views on social systems, roles, formal organization, power, stratification, decision-making, social values) on the policy process. (Fall)

254 **Seminar: Methods in Social Policy Research** (3) Boeckmann

Systematic survey of conceptualization, design and practice of evaluation research of social experiments, and of simulation and technological forecasting. Prerequisite: Stat 105, Soc 230, 252; or permission of instructor. (Spring)

*259 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3) (Same as Law 475 [2]) Courtless

*261 **Law and Criminology II: Society's Responses to the Criminal Offender** (3) (Same as Law 476 [2]) Courtless

263 **Seminar: Law and Society** (3) Courtless

Selected problems in law as an instrument of social policy; emphasis on the organization of legal decision-making processes. (Summer)

265 **Seminar: Criminal and Juvenile Justice Systems** (3) Courtless, Tropea

Development of a systematic perspective on components and relationships constituting the juvenile and criminal justice systems. (Spring)

* Students registering for Soc 259 or 261 make special arrangements with the instructor for supplementary assignments equivalent to one additional semester hour. For description of the courses, see the *National Law Center Catalogue*.

295 **Research** (arr.) Staff

Independent study and special projects. Before a student is permitted to register for Soc 295, he must submit a written proposal of his plan of study for the approval of the Staff member of the Department who will be directing his research. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

333 **Seminar: Theory Construction and Application** (3) Tropea, Wallace

Critical examination of the elements of current theories in the social sciences with the major objective of developing general principles of theory construction; consideration of the functions of theory in sociological research. (Fall)

351 **Selected Topics in Sociology** (3) Staff

Intensive investigation of special topics in sociology. May be repeated for credit. The following topic(s) will be offered as the demand requires each fall semester: (1) *Social Research*—causal inference in social research, evaluation research, philosophy of science, etc.; (2) *Political Sociology*—comparative political structures, processes of policy formation, social movements, etc.; (3) *Sociology of Work*—work and public bureaucracies, industrial sociology, etc.

352 **Selected Topics in Sociology** (3) Staff

Intensive investigation of special topics in sociology. May be repeated for credit. The following topic(s) will be offered as the demand requires each spring semester: (1) *Sociological Theory*--study of important theorists such as Marx, Weber, Parsons, important themes such as social change, social control; important schools such as symbolic interactionism, general systems theory. (2) *Urban Sociology*—ecological processes, suburbanization, the urban school, race and ethnic relations, etc.; (3) *Law and Society*—the police and the community, the sociology of law, theories of deviance, etc.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Spanish

See "Romance Languages and Literatures."

Special Education

Professors P. Botwin (*Chairman*), R.S. Cottrell, Jr., R.K. Ives
Associate Professor J.R. Shotel
Assistant Professors R.W. Prouty, M.S. Castleberry, L.A. Tsantis, S.J. Little
Instructors J.S. Landy, N.J.S. Sobel, J.L. McCauley

Programs of study in Special Education leading to the degrees of *Bachelor of Arts in Education*, *Master of Arts in Education*, and *Doctor of Education* are offered by the School of Education (see pages 107–37).

SECOND GROUP

101 **Seminar: Dimensions of the Complementary Teaching Role** (3) — Little

Instructional experiences designed to refine the insights and competencies essential for successful operation of the complementary teaching model. (Fall)

102 **Teaching the Child with Special Needs: Methods and Materials** (3) — Staff

Laboratory course taught in an elementary public school. Students observe and participate in a demonstration seminar conducted by the instructor. Must be taken concurrently with SpEd 189. (Fall)

103 **Teaching the Child with Special Needs: Creative Programming** (3) — Staff

Continuation of SpEd 102. Concentration on the total programming of the child with special needs. Must be taken concurrently with SpEd 190. (Spring)

170 **Interpersonal/Intrapersonal Relationships for Special Education Teachers** (3) — Little

Consideration of factors leading to successful interaction with children. (Fall)

189 **Preprofessional Practicum: Observing the Special Child in the Regular Class Milieu** (3) — Little

Supervised internship in school setting. Emphasis on intensive study of a child evidencing special needs. Must be taken concurrently with SpEd 102. (Fall)

190 **Preprofessional Practicum: Inspecting a Continuum of Special Education Services** (3) — Staff

Observation and participation in various special education settings. Emphasis on exposure to and familiarity with goals and programs of various special education models. Must be taken concurrently with SpEd 103. (Spring)

197–98 **Special Study in Special Education** (3–3) — Little

Individual or group study or research under the guidance of staff members. Program and conferences arranged with adviser. Admission by permission of adviser. (Academic year)

199 **Practicum in Complementary Teaching** (6) Little

Supervised teaching internship in a school-based intervention program Student teaching with children identified as needing special educatio services. A minimum of 240 clock hours required. Admission by permi sion of the instructor.

200 **Understanding Young Exceptional Children** (3) Staff

Lecture and field experience. Application of the basic concepts of earl child development as applied to special education. (Fall)

THIRD GROUP

201 **Introduction to Special Education** (3) Botwin

Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications nec- essary to accomodate children in a school program. (Fall)

222 **Special Education in the Regular Classroom** (3) McCauley

Special techniques and materials for regular classroom teachers to assist children who have learning and/or behavior problems; emphasis on specific, practical strategies and applications. Open to undergraduate seniors and regular class teachers. (Spring)

240 **The Crisis-Resource Teacher** (3) Staff

Rationales, operational models, techniques, and problems relevant to the implementation of crisis-resource teacher programs. (Fall)

241 **Practicum in Crisis-Resource Teaching** (6) Staff

Practicum experience early in the training sequence in crisis-resource teaching. Under the direction of qualified teachers in a field setting. A minimum of 280 clock hours required. (Fall)

242 **Specialized Techniques and Materials for Crisis-Resource Teachers** (3) Staff

Lectures, discussions, techniques, and selected materials exploring the psycho-educational factors used in crisis-resource teaching. Admission by permission of instructor. (Fall)

250 **Specialized Techniques and Materials for Diagnostic-Prescriptive Teachers** (3) Prouty

Selected materials and techniques used in diagnostic-prescriptive teaching Must be taken concurrently with SpEd 252. Admission by permission of instructor. (Fall)

251 **Psychosocial Factors in Special Education** (3) Prouty

Psychosocial factors significant to the process of the special education school-based consultant. Admission by permission of instructor. (Fall

252 **Practicum for Diagnostic-Prescriptive Teachers** (6) Landy, McCauley

Supervised school experience in diagnostic-prescriptive teaching. Must be taken concurrently with SpEd 250. Admission by permission of instructor. A minimum of 280 clock hours required. (Fall)

253 **The Humanizing Curriculum and the Special Education Consultant** (3) — Landy

Curriculum concepts and modifications aimed at enhancing the classroom environment for learning and growth. Admission by permission of instructor. (Fall)

260 **The Assessment Process: Identification and Psycho-educational Assessment of Young Exceptional Children** (3) — Castleberry, Tsantis and Staff

Lectures, demonstrations, and clinical practice in formal and informal assessment procedures. Admission by permission of instructor. (Fall)

261 **Practicum: Methods and Materials for Young Exceptional Children** (3) — Ives, Tsantis

(Formerly The Teaching/Learning Process: Methods and Materials for Young Exceptional Children)

Clinical practice in design and implementation of educational strategies and materials. Three dimensions: designing and developing teaching materials, classroom teaching, feedback and evaluation with professor. Taught at a demonstration site. Requires eight hours a week in service. (Fall)

262 **Seminar: the Education of Young Exceptional Children** (3) — Castleberry, Tsantis, Shotel and Staff

Weekly seminar dealing with experiences, problems, and concerns encountered during the internship for the education of young exceptional children. Must be taken concurrently with SpEd 292. Admission by permission of instructor. (Spring)

263 **Introduction to the Education of the Severely and Multiply Handicapped** (3) — Staff

Survey of the characteristics and learning patterns of children with severe disabilities. Lecture and field experience. (Fall)

264 **Advanced Study in the Special Education of Severely and Multiply Handicapped Children** (3) — Sobel

Specialized programs, techniques, and methods for teaching children with severe disabilities. (Spring, even years)

265 **Clinical Experience with Multiply Handicapped and Developmentally Disabled Young Children** (3) — Ives

Preliminary field experience designed for students with no experience in early childhood special education. Supervised experience necessary for program articulation. Three week intensive involvement in an early childhood special education setting.

266 **Problems in Language Development in Young Exceptional Children** (3) — Shotel

Introduction to the study of language acquisition and the application of current research on language of handicapped children. (Fall)

267 **The Role of the Early Childhood Special Educator** (3) — Tsantis, Sobel

Examination of the spectrum of roles available in early childhood special

education; emphasis on role expectations and psychosocial dynamics o the various settings. (Spring)

268 **The Development of Young Exceptional Children with Emphasis on Handicapping Conditions** (3) Sobe

Lecture (2 hours), site visitation (3 hours), discussion (2 hours). (Fall)

269 **Psychosocial Concerns of the Early Childhood Special Educator** (3) Ives, Castleberry

Seminar involving student presentations focusing on sociological and psychological constructs relevant to interpersonal/intrapersonal relation ships. (Fall)

270 **Adapting the Early Childhood Curriculum to Meet Special Needs** (3) Sobe

Review of the basic curriculum areas as they relate to the development of readiness skills in special education. (Spring, even years)

271 **The Interdisciplinary Approach to Planning for the Severely and Multiply Handicapped** (3) Staff

Laboratory experience in which students participate as educational mem bers of an interdisciplinary team. (Spring)

273 **Seminar for Special Education Strategist Intern** (3) Ives

Weekly seminar dealing with experiences, problems, and concerns en countered during special education/early childhood strategist internship Concurrent enrollment in SpEd 293 required. (Spring)

290 **Control and Management Techniques in the Classroom** (3) Staff

Examination of the theory, techniques, and tools essential for group con trol. Designed to provide practice as well as familiarity with the various theories of control of human behavior. Admission by permission of instructor.

291 **Internship in Crisis-Resource Teaching** (9) Staff

Supervised field experience in the crisis-resource teacher program. Under the direction of a qualified teacher and the supervision of the University staff. Minimum of 420 clock hours required. (Spring)

292 **Professional Internship in Education of Young Exceptional Children** (6 or 9) Tsantis, Castleberry Shotel and Staff

Supervised internship in the education of young exceptional children. A minimum of 420 clock hours required. Must be taken concurrently with SpEd 262. (Spring)

293 **Professional Internship for the Special Education/Early Childhood Strategist** (9) Ives

Supervised internship in strategist role, emphasizing diversified, multi dimensional aspects of a special education/early childhood program. A minimum of 420 clock-hours is required. Concurrent enrollment in SpEd 273 required. (Spring)

294 **Internship in Diagnostic-Prescriptive Teaching** (9) Landy, McCauley

Supervised field experience in diagnostic-prescriptive teacher programs. A minimum of 420 clock hours required. Admission by permission of instructor. (Spring)

297–98 **Individual Study in Special Education** (3–3) Staff

Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. (Academic year)

303 **Administration and Supervision of Special Education** (3) Botwin

Philosophy and nature of special education; litigation, program organization, administration, and development. Surveying local-level needs; program evaluation and supervision. Admission by permission of instructor. (Spring)

306 **Dynamics of Family Intervention: Theory and Practice in Special Education** (3) Ives, Castleberry, Sobel

(*Formerly The Design of Family Education Programs: Theory and Practice*)

Theoretical foundations and clinical practice in working with parents and community agencies in meeting the educational needs of young exceptional children. (Spring)

350 **The Diagnostic-Prescriptive Teacher** (3) McCauley

Rationale, operational models, techniques, and problems relevant to implementation of diagnostic-prescriptive teacher programs. Admission by permission of instructor. (Fall)

351 **Seminar: School-based Consultants in Special Education** (3) Landy

Current practices in regular and special education as they affect the school-based consultant; emphasis on concurrent field experience. Admission by permission of instructor. (Spring)

352 **Seminar: Special Education Consultant Programs in the Schools** (3) Prouty

For school-based consultants in special education; focuses on in-school program development and recent trends in processes and procedures. Admission by permission of instructor. (Fall)

370 **Intrapersonal Dynamics in Special Education** (3) Prouty

Small group exploration of intrapersonal factors essential to understanding roles and interpersonal techniques in teaching exceptional children. Admission by permission of instructor. (Spring)

FOURTH GROUP

401 **Doctoral Mini-Seminar in Special Education** (1) Staff

Participation in a small group with a selected faculty member; intensive study and discussion of an area of common interest in an informal environment providing for the exchange of ideas and optimum potential for personal and professional growth. Admission by permission of instructor. (Fall)

453–54 **Doctoral Internship: Special Education** (6–6) Shotel
Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of adviser. (Academic year)

480 **Evaluation in Special Education** (3) Shotel
(Formerly Evaluation Seminar in Special Education/Early Childhood)
Application of educational evaluation models to special education situations. Special consideration given to the work of Haines, Popham, Scriven, Stake, Stufflebeam, TABA, and Tyler. Practical application of the theoretical models will be stressed. (Fall)

490 **Departmental Seminar in Special Education** (3) Shotel
Provides an opportunity for selected graduate students to develop, refine and demonstrate their skills and abilities in a small-group setting with fellow students and department faculty. Admission by permission of instructor. (Spring)

491 **Dissertation Research** (arr.) Staff
(Fall and spring)

Speech and Drama

Professors E.L. Stevens, J.W. Hillis (*Director of Speech Pathology and Audiology*), L.S. Bowling (*Chairman*), W.M. Reynolds (*Director of Speech Communication*)
Professorial Lecturer G. Herer
Associate Professors L.S. Bielski, M.D.M. Brewer
Associate Professorial Lecturer B.P. Cox
Assistant Professors J.R. Regnell, N.C. Garner (*Acting Director of Theatre*), S. Keller (*Director of Forensics*), V.P. Parady, D.L. Skolnick, B.W. Sabelli
Assistant Professorial Lecturers J.H. Dudley, F. Arant, M.O. Regan

Bachelor of Arts with a major in Dramatic Art (Departmental).—The following requirements must be fulfilled:
1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—SPDR 1, 11.
3. Required courses in related areas—24 semester hours of second-group courses outside the department of speech and drama as approved by the major adviser. (Courses in dramatic literature offered in the classics, English, and foreign language departments are strongly recommended.)
4. Required courses in the major—SPDR 151, 165–66; 15 additional semester hours in second-group drama courses.

Bachelor of Arts with a major in Speech Communication and Broadcasting (Departmental).—The following requirements must be fulfilled:
1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—SPDR 1, 11.

3. Required courses in related areas—12 semester hours in psychology and/or philosophy as approved by the major adviser; 18 semester hours in a single subject area outside the department of speech and drama as approved by the major adviser.

4. Required courses in the major—SPDR 112, 121, 126; 15 additional semester hours of second-group courses in the department of speech and drama as approved by the major adviser.

Bachelor of Arts with a major in Speech Pathology and Audiology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—SPDR 1, 11.

3. Required courses in related areas—Psyc 115, 121 and 131 (or their equivalent), plus 15 additional semester hours of second-group courses selected from related areas as approved by the major adviser.

4. Required courses in the major—SPDR 101, 103, 104, 106, 118, 119; 6 additional semester hours of courses in the department of speech and drama as approved by the major adviser.

Master of Arts in the field of Speech Pathology and Audiology.—Prerequisite: the degree of Bachelor of Arts with a major in speech pathology and audiology from this University, or an equivalent degree, and the score on the Aptitude Test of the Graduate Record Examination.

Required: the general requirements, pages 95–102. The program of study consists of 36 semester hours of approved course work without a thesis, or with the approval of the department, 24 semester hours of approved course work plus a thesis (equivalent to six semester hours). All students must satisfy the academic and supervised practicum requirements of the Certificate of Clinical Competence awarded by the American Speech and Hearing Association.

All students must take the National Examination in Audiology or in Speech Pathology available through the Educational Testing Service. Students must request the Testing Service to send copies of the test scores to the department of speech and drama to be used in the fulfillment of the general requirement in the Graduate School of Arts and Sciences for the Master's Comprehensive Examination. Satisfactory test results must reach the department early enough to be filed with the Graduate School Office no later than the day before the faculty meets to approve the list of graduates (approximately two weeks before graduation).

Master of Fine Arts in the field of Dramatic Art.—Prerequisite: the degree of Bachelor of Arts from this University, or an equivalent degree.

Required: the general requirements, pages 95–102. The program of study consists of (1) 30 semester hours of second- and third-group course work planned in consultation with the adviser; (2) a creative thesis (equivalent to six additional semester hours) in the selected area of concentration; and (3) a written comprehensive examination. Each candidate is expected to complete the program in residence in four continuous academic-year semesters.

Bachelor of Arts in Education with a teaching field in Speech and Drama.—Prerequisite: the education curriculum, pages 81–82.

Required: the speech and drama option and the professional courses listed on pages 125–26.

Speech and Hearing Therapy: See Speech and Hearing Clinic, page 53.

FIRST GROUP

1 Communicative Speaking and Listening (3) Reynolds and Staff

Basic theories and principles of speech communication; composition, delivery, and criticism of speaking in interpersonal, group, and public situations. Recording fee, $4. (Fall and spring)

11 Voice and Diction (3) Bielski and Staff

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4. (Fall and spring)

32 Oral Interpretation of Literature (3) Staff

Theory and practice in discovering and communicating orally the meaning in literature through analysis of form and content. Techniques of reading prose, poetry, and drama for listeners. Prerequisite: SPDR 11. Recording fee, $4. (Fall and spring)

45 Understanding the Theater (3) Parady

The art of the theater: its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through lectures, visiting artists, class discussion, and attendance at theatrical performances. Primarily for nonmajors. (Fall and spring)

49 Rhetoric in Political and Social Action (3) Reynolds

Study of the use and abuse of rhetoric in contemporary political and social movements. Influence of speech communication on opinion-making examined by means of readings, guest speakers, and field projects. (Fall)

SECOND GROUP

101 Bioacoustics (3) Brewer

Acoustic analysis of speech and the physiology of reception and processing of speech by the human auditory system. Prerequisite: BiSc 3–4 or 11–12 or equivalent; Psyc 1 or 5 or 6 or equivalent. (Fall)

103 Biophonetics (3) Staff

Biological bases of speech production. Emphasis on the contribution of the nervous system, the respiratory system, and the vocal and articulatory mechanisms in the production of intelligible speech. Prerequisite: BiSc 3–4 or 11–12 or equivalent; Psyc 1 or 5 or 6 or equivalent. (Fall)

104 Introduction to Speech Pathology (3) Regnell

Survey of the field of speech pathology. The effect of body-system pathologies and environmental factors on the production of speech and language. Prerequisite: SPDR 103. (Spring)

106 Introduction to Audiology (3) Brewer

Survey of the field of audiology. The effect of body-system pathologies on the reception of speech and other acoustic stimuli. Procedures of pure-tone and speech audiometry. Clinical and educational services for the hearing impaired. Prerequisite: SPDR 101. (Spring)

111 **Business and Professional Speaking** (3) Stevens

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors. (Fall)

112 **Persuasion** (3) Keller

(Formerly Advanced Public Speaking)

In-depth study of the principles and techniques of persuasive speaking, with emphasis on the psychological factors in audience analysis and adaptation. Prerequisite: SPDR 1 or permission of instructor. Recording fee, $4. (Spring)

115 **Acting I** (3) Garner

Basic techniques of concentration, imagination and character analysis. Concurent registration in HKLS 124 required. Prerequisite: SPDR 11, 32. (Fall)

116 **Acting II** (3) Garner

Principles of role development. Scene study, principally in 20th century realism. Concurrent registration in HKLS 116 required. Admission by audition. Prerequisite: SPDR 115. (Spring)

118 **Structural Analysis of Speech and Language** (3) Staff

Development of skills in the phonetic/phonemic transcription and syntactic analysis of oral language samples. Prerequisite: Psyc 115 or equivalent. (Spring)

119 **Clinical Procedures for Communication Disorders** (3) Hillis

Development of skill in precision treatment techniques for communication disorders. Emphasis on accountability of providers of clinical and educational services for the communicatively handicapped. Prerequisite: Psyc 121 and 131, or equivalent; senior standing or permission of instructor. (Fall)

121 **Group Discussion and Conference Leadership** (3) Stevens

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: SPDR 1 or permission of instructor. (Fall and spring)

126 **Argumentation and Debate** (3) Reynolds

Study of the advocacy system; special emphasis on issue identification, use of evidence, and logical proof. Extensive practice in argumentative speaking. Recording fee, $4. Prerequisite: SPDR 1 or permission of instructor. (Spring)

127–28 **Advanced Debate Practice** (1–1) Keller

Admission by permission of instructor, after one semester of satisfactory participation in intercollegiate debate program. May be repeated for a total of 4 semester hours of credit. (Fall and spring)

133 **Broadcasting in America** (3) Skolnick

Study of the origins, structure, and nature of American broadcasting with emphasis on communicative factors and effects of television programming. (Fall)

134 **Radio Production and Performance** (3) Skolnick

Introduction to the basic concepts of radio as a communication medium; emphasis on the design and production of a variety of radio programs. Prerequisite: SPDR 133 or permission of instructor. Recording fee, $5. (Spring)

135–36 **Radio Workshop** (1–1) Skolnick

Practical work in campus radio station. Admission by permission of instructor, after one semester of satisfactory participation in WRGW activities. May be repeated for a total of four semester hours of credit. (Academic year)

143 **Origins of Contemporary Rhetorical Theory** (3) Reynolds

Study of rhetorical theory and method as they evolved in the Western world from the classical period to the present. (Fall, even years)

144 **History and Criticism of American Public Address** (3) Reynolds

Study of American oratory from its pre-Revolution origins to the present day, interpreted in terms of issues and movements. (Spring, odd years)

145 **Television Production and Performance** (3) Skolnick

Basic course in television production techniques and skills. Programming, directing, script-writing, and other aspects of television production. Extensive practice in working television equipment; emphasis on various in-studio projects. Recording fee, $5. Prerequisite: SPDR 133 and permission of instructor. (Fall)

146 **Advanced Television Production and Performance** (3) Skolnick

Advanced study and practice of television production techniques. Students are expected to demonstrate skill in working with studio equipment and in the development of television programs from original concepts to final productions. Recording fee, $5. Prerequisite: SPDR 145 and permission of instructor. (Spring)

151–52 **Stagecraft** (3–3) Sabelli

Lecture (2 hours), laboratory (1 hour). Theories and practicum in construction, rigging, lighting, and scene painting. Prerequisite to SPDR 152: SPDR 151. (Academic year)

154 **Directing** (3) Garner

Fundamentals of script analysis, casting and rehearsal techniques. Prerequisite: SPDR 115 and 151. Laboratory fee, $5. (Fall)

155–56 **Play Production Practice** (1–1) Sabelli

Practical work in theatre. Assigned production duties in one of the following areas: scenery, costuming, lighting/sound, properties, public relations, acting. May be repeated for a total of four semester hours of credit, but a different area must be elected at each registration. (Academic year)

161–62 **Theatrical Styles** (3–3) Staff

Detailed study of the culture, climate, and production techniques of significant periods of drama. Prerequisite: SPDR 165–66. (Academic year)

165–66 **History of the Theater** (3–3) Parady

An examination of the development and growth of the theater from its beginnings to the present. SPDR 165: Greek through Restoration. SPDR 166: the 18th century to the present. (Academic year)

169 **Introduction to Creative Dramatics** (3) Staff

Study of philosophies and practices underlying dramatics with children; materials and methods for conducting improvised dramatic activities in elementary and secondary education. (Spring)

*192 **The American Cinema** (3) Mergen

History and criticism of American films. The course will enable the student to develop an ability to see and evaluate cinema techniques, to express the evaluation clearly in writing and to understand the role of films in the context of American culture.

193 **Scene Design** (3) Sabelli

Fundamental study of scenography, including drafting, rendering and model construction. (Fall)

195 **Costuming** (3) Parady

Study of costume history, materials, and construction. Admission by permission of instructor. (Fall)

196 **Independent Study** (1 to 6) Staff

Independent research and special projects. Open only to undergraduate students in their senior year. Before a student is permitted to register for SPDR 196, he must submit a written proposal of his plan of study and obtain approval of the staff member who will be directing the study as well as of the Departmental Chairman.

THIRD GROUP

SPDR courses numbered from 268 through 290 and SPDR 295 are for Master of Arts candidates in the field of speech pathology and audiology; other students may be admitted by permission of the department.

215–16 **Acting: Scene Study** (3–3) Staff

Scene work in classic and other nonrealistic drama. Admission by audition. Both courses may be repeated once for credit. Recording fee, $4. (Academic year)

251 **Advanced Scene Design** (3) Sabelli

Project work in all styles of traditional and modern scenography. Admission by permission of instructor. (Spring, odd years)

252 **Advanced Costuming** (3) Parady

Study of special design, style, and construction problems. Admission by permission of instructor. (Spring, even years)

255 **Lighting Design** (3) Sabelli

Theory and practice of stage lighting. Prerequisite: SDPR 152. (Spring, even years)

* Joint offering of the department of speech and drama and the American Studies Program. Students may register under either designation.

256 **Advanced Directing** (3) Garner
Methods of rehearsal for selected directorial problems. (Spring)

257 **Modern Trends** (3) Staff
Study of recent developments in dramatic theory, literature, and production. (Fall, even years)

258 **Theater Management** (3) Staff
Theory and practice in the psychology of handling the public: promotion, box office and house management. Admission by permission of instructor. (Fall, odd years)

*267 **Interdisciplinary Study of Language Disorders** (3)
For graduate students in education, speech and hearing and psychology. Psycho-educational team participation, team diagnosis and analysis of case studies. Multidisciplinary understanding of philosophies of learning and treatment of symbolic malfunctioning. (Fall)

268 **Clinical Practice in Communication Disorders** (1–3) Staff
Supervised clinical practice in the evaluation and treatment of communication disorders. May be repeated for a total of 3 semester hours of credit. (Fall and spring)

269 **Community Programs in Communication Disorders** (3) Herer
Methods and procedure for the planning, management, and operation of hospital, school, and other community programs for the communicatively handicapped. (Fall)

271 **Evaluation of Speech Articulation Disorders** (2) Regnell
Evaluation of persons with speech articulation disorders: staffing of clinical cases, test demonstrations, critical evaluations of speech articulation testing procedures. Laboratory fee, $5. (Fall)

272 **Etiology of Speech Articulation Disorders** (2) Hillis
Biological, linguistic, and psychological bases for disorders of speech articulation; staffing of clinical cases. Laboratory fee, $5. (Spring)

273 **Treatment of Speech Articulation Disorders** (2) Regnell
Treatment procedures of persons with disorders of speech articulation, emphasis on programmed and other objective procedures for the improvement of speech articulation; staffing of clinical cases. Laboratory fee, $5.

274 **Treatment of Fluency Disorders in Adults** (2) Hillis
Evaluation and treatment of fluency disorders in adults; staffing of clinical cases; demonstration and critical evaluation of testing and treatment procedures. Laboratory fee, $5. (Fall)

275 **The Nature of Fluency Disorders** (2) Hillis
Theoretical bases for the treatment of fluency disorders; staffing of clinical cases. Laboratory fee, $5. (Spring)

* An interdisciplinary course offered by the departments of education, psychology and speech and drama.

276 **Treatment of Fluency Disorders in Children** (2) Hillis

Evaluation and treatment of fluency disorders in children; staffing of clinical cases; demonstration and critical evaluation of testing and treatment procedures. Laboratory fee, $5.

277 **Clinical Evaluation of Language Disorders** (3) Staff

Evaluation of language disorders in children and adults; class staffings of language pathology cases, test demonstrations, and critical evaluations of formal and informal language testing procedures. Laboratory fee, $7.50. (Fall)

278 **Applied Research in Language Disorders** (3) Staff

Current neurolinguistic and psycholinguistic research related to language pathologies in children and adults; emphasis on the treatment of aphasia in adults including demonstrations of objective procedures for charting clinical progress. Laboratory fee, $7.50. (Spring)

279 **Clinical Treatment of Language Disorders in Children** (3) Staff

Current language therapy programs for children and critical evaluation of these programs in light of modern psycholinguistic concepts; emphasis on objective procedures for attaining or modifying desired goals in language therapy for children with various handicapping conditions. Laboratory fee, $7.50. (Summer)

280 **Functional Voice Disorders** (2) Regnell

Review of the normal structure and function of the vocal mechanism, acquisition of knowledge and of clinical/educational skills in providing speech evaluation and treatment for persons with functional voice disorders. Laboratory fee, $5. (Fall)

281 **Alaryngeal Speech** (2) Regnell

Acquisition of knowledge and of clinical/educational skills in providing speech evaluation and treatment for laryngectomized persons. Laboratory fee, $5. (Spring)

282 **Organic Voice Disorders** (2) Regnell

Acquisition of knowledge and of clinical/educational skills in providing speech evaluation and treatment for persons with organic voice disorders; special consideration given to the management of voice disorders in children. Laboratory fee, $5. (Spring)

283 **Aural Rehabilitation** (3) Brewer

Systems, principles, and methods of auditory training and speech reading, including development of lesson plans and their application in resolving communication problems of acoustically-handicapped individuals. Laboratory fee, $7.50. (Fall)

284 **Advanced Clinical Audiology** (3) Bowling

Principles and methods underlying assessment of auditory disorder; emphasis on bone conduction, masking, and speech intelligibility. Clinical implications, tests; demonstration and practicum. Laboratory fee, $7.50. (Fall)

285 **Hearing Aids** (3) Brewer

Discussion of hearing-aid characteristics and electroacoustic measure-

ments; hearing-aid effectiveness in improving communicative efficiency; procedures for selection and clinical evaluation of hearing aids; counseling of the patient. (Spring)

286 **Special Auditory Tests** (3) Bowling

Special speech and pure tone audiometric techniques for differentiating conductive, cochlear, and retro-cochlear lesions, for identifying functional hearing losses. Clinical application of tests and interpretation of results. Laboratory fee, $7.50. (Fall)

287 **Auditory Processing** (3) Bowling

(*Formerly Auditory Perception and Comprehension*)

Detailed study of the factors which affect auditory perception and comprehension; methods and procedures used in identifying disorders of auditory perception and comprehension. Laboratory fee, $7.50. (Spring and summer)

288 **Psychosocial Aspects of Hearing Loss** (3) Bowling

Consideration of the rationale and procedures for evaluating the social and emotional behavior as well as the intellectual potential of those with impaired hearing. Laboratory fee, $7.50. (Spring)

289 **Pediatric Audiology** (3) Cox

Development of skills in audiological assessment of young children and other difficult-to-test groups. Laboratory fee, $7.50. (Spring)

290 **Management of the Hearing-impaired Child** (3) Brewer

Overall management approach to the hard-of-hearing child including diagnosis, parent counseling, amplification, educational placement, treatment programs and procedures, and re-evaluation. Emphasis on aural habilitation within an educational framework. (Summer)

294 **Independent Research in Dramatic Art** (arr.) Staff

May be repeated for credit. (Fall and spring)

295 **Independent Research in Speech and Hearing** (arr.) Staff

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

Statistics

Professors H.F. Bright, S. Kullback (*Emeritus*), H.W. Lilliefors, A.D. Kirsch, R.H. Shumway, J. Cornfield (*Chairman*), J.L. Gastwirth, L. Shaw (*Research*), N. Mantel (*Research*), D. Krueger (*Research*), S.W. Greenhouse

Professorial Lecturers F.C. Leone, H. Weingarten, J. Bailar III

Associate Professors C.T. Ireland, R.E. Thomas

Associate Professorial Lecturers M.A. Schwartz, F. Frishman, J.H. Ware, K.M. Wolter

Assistant Professors J.P. Dirkse III, J.M. Lachin III (*Research*)

Adjunct Assistant Professor J.K. Kern

Assistant Professorial Lecturers W. Rutiser, T.C. Teeples
Lecturer J. Aigner

Bachelor of Arts or *Bachelor of Science with a major in Applied Statistics (Departmental) or Mathematical Statistics (Departmental) or Statistics with an option in Computer Science (Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 77–78, 85–91. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Humanities and Social Studies.)

2. Prerequisite courses for all three majors—Math 31, 32; Stat 91.

3. (a) Required course in related areas for the applied statistics major—Math 124. (Courses in computer science and some field of application are recommended. Foreign language is not required for this major.)

(b) Required courses in related areas for the mathematical statistics major—Math 124, 139, 140, 157; two years of introductory French, German or Russian, or equivalent. (Courses in computer science, mathematics and some field of application are recommended.)

(c) Required courses in related areas for the statistics major with an option in computer science—Math 113, 124, 153. (Foreign language is not required for this major.)

4. (a) Required courses in the applied statistics major—Stat 100, 110, 117, 118, 157–58, 189; plus three approved second-group courses in statistics.

(b) Required courses in the mathematical statistics major—Stat 97 or 100, 117, 118, 157–58, 189–90; plus three approved second-group courses in statistics.

(c) Required courses in the statistics major with an option in computer science—Stat 100, 110, 114 (in that order), 117, 157–58, 183; plus three approved electives in mathematics and statistics (Math 101, 270 and Stat 197, 198 are recommended).

To assure a balanced program, departmental approval of elective is required for both majors.

Master of Science in the field of Applied Statistics or *Master of Arts in the field of Mathematical Statistics.*—The program of study consists of 30 semester hours of course work without a thesis. In exceptional cases the department may approve a program of study consisting of 24 semester hours of course work plus a thesis, equivalent to six additional semester hours. Candidates must pass a written Master's Comprehensive Examination and must fulfill the tool requirement by passing either a reading knowledge examination in an acceptable foreign language or an examination in computer language. The successful completion of coursework in computer programming does not obviate the requirement to pass a special examination should the computer option be elected as a tool. For prerequisites and additional requirements, see below.

Master of Science in the field of Applied Statistics.—Prerequisite: a bachelor's degree with a major in applied statistics from this University, or an equivalent degree. If undergraduate study did not include equivalent required courses at this University, those courses must be taken as prerequisite to graduate study.

Required: the general requirements, pages 95–102, including a minimum of 18 semester hours of statistics. Courses are selected in consultation with the adviser.

Master of Arts in the field of Mathematical Statistics.—Prerequisite: a bachelor's degree with a major in mathematical statistics from this University, or an equivalent degree. If undergraduate study did not include equivalent courses at this University, those courses must be taken as prerequisite to graduate study.

Required: the general requirements, pages 95–102, including Stat 201–2 and 217–18. The remaining 18 semester hours must be selected in consultation with the adviser.

Doctor of Philosophy in the field of Mathematical Statistics.—Prerequisite: the degree of Master of Arts in the field of mathematical statistics from this University, or an equivalent degree.

Required: the general requirements, pages 95–97, 102–104. A minimum of 2 semester hours of coursework must be taken in residence at this University befor the General Examination may be completed. The General Examination consists o two written parts followed by an oral examination. Part I covers mathematics an probability and may be taken after successful completion of Stat 259 or 273. Pa II may be taken after the successful completion of the remaining core courses (Sta 201–2, 217–18, 257–58, 263–64, 265, 287) and electives selected in consultatio with the adviser. The tool requirement may be fulfilled by passing a reading knowledg examination in one foreign language and an examination in computer language. The successful completion of course work in computer programming does no obviate the requirement to pass a special examination should the computer option b elected as a tool.

Research Fields: Bayesian inference, biostatistics, design of experiments, infor mation theory, multivariate analysis, nonparametric statistics, probability, robus methods, sampling, statistical inference, stochastic processes and time series analysis

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Departmental prerequisite: One entrance unit in algebra is prerequisite to all first-group courses in statistics.

FIRST GROUP

*51 **Introduction to Business and Economic Statistics** (3) Bright, Kern

Lecture (3 hours), laboratory (1 hour). Frequency distribution, de scriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18. (Fall and spring)

*53 **Introduction to Statistics in Social Science** (3) Staff

Lecture (3 hours), laboratory (1 hour). Frequency distributions, de scriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, analysis of variance. Laboratory fee, $18. (Fall and spring)

*91 **Principles of Statistical Methods** (3) Lilliefor

Lecture (3 hours), laboratory (1 hour). Variables and attributes, aver ages and dispersion, frequency distributions and their characteristics, re gression and correlation, statistical decision processes. Laboratory fee, $18. (Fall and spring)

97 **Introduction to Computer Programming** (3) Staff

Lecture (2 hours), laboratory (2 hours). Computer and programming concepts. High-level language programs written by students will be run on the University computer. Laboratory fee, $25. (Fall and spring)

SECOND GROUP

100 **Introduction to Computing** (3) Thomas

(*Formerly Stat 98*)

Development of basic computing ideas using a high-level language. Em

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* Stat 51, 53 and 91 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree.

phasis on careful design and implementation of programs using "structured programming." Laboratory fee, $25. (Fall)

103 **Statistics in Business** (3) Staff

Advanced study of statistical techniques in business. Prerequisite: Stat 51 or equivalent. Laboratory fee, $18. (Spring)

105 **Statistics in the Behavioral Sciences and Education** (3) Kirsch

Lecture (3 hours), laboratory (1 hour). Advanced study of statistical techniques for research problems. Analysis of variance, correlation techniques, nonparametric techniques, sampling theory. Prerequisite: Stat 53 or equivalent and satisfactory performance on a placement examination. Laboratory fee, $18. (Fall and spring)

110 **Computer Programming** (3) Thomas and Staff
(*Formerly Stat 113*)

Lecture (2 hours), laboratory (2 hours). Computer concepts beyond the introductory level; an introduction to assembly language and advanced high-level language programming. Prerequisite: Stat 98. Laboratory fee, $25. (Spring)

111 **Business and Economic Statistics I** (3) Gastwirth, Thomas

Statistical processes as tools in decision-making in areas of economics and business. (Fall)

112 **Business and Economic Statistics II** (3) Staff

Case work to illustrate quantitative procedures for solution of economic and business problems. Prerequisite: Stat 111 or equivalent. (Spring)

114 **Data Structures** (3) Staff

Files and file systems. Basic structure of processing operations, creation updating, sorting, merging, searching, linkage, hashing. Introduction to data processing, storage and retrieval. Emphasis on computer techniques. Prerequisite: Stat 113. Laboratory fee, $25. (Fall)

117 **Analysis of Variance** (3) Ireland

Lecture (3 hours), laboratory (1 hour). Introduction to the design of experiments and analysis of variance; random block, factorial, Latin square, and analysis of covariance. Prerequisite: Stat 118. Laboratory fee, $18. (Spring)

118 **Regression Analysis** (3) Staff

Lecture (3 hours), laboratory (1 hour). Regression and correlation theory; simple, partial, and multiple. Prerequisite: 3 semester hours selected from Stat 51, 53, 91, 107. Laboratory fee, $18. (Fall and spring)

119 **Bases of Statistical Decision-making** (arr.) Kern

For students in the Navy Graduate Financial Management Program only. Introduction to techniques of decision-making; emphasis on applications rather than theory.

123 **Introduction to Econometrics** (3) Staff

Construction and testing of economic models: regression theory, para-

† Interdepartmental course offered by the departments of statistics and economics

meter estimation, and statistical techniques applicable to economic models. Prerequisite: Econ 101, 102; Math 31 or 51; Stat 111. (Spring)

127 **Statistics for the Biological Sciences** (3) Greenhouse

Introduction to statistical techniques and reasoning applicable to the bio- medical and related sciences. Properties of basic probability functions binomial, Poisson, and normal. Data analysis, inference, and experimenta design. (Fall)

131 **Contingency Table Techniques** (3) Staff

Analysis of multidimensional contingency tables, including estimation tests of hypotheses, and log-linear regression. Prerequisite: Stat 118 or permission of instructor. Laboratory fee, $18. (Spring)

153–54 **Mathematical Models in Population Genetics** (3–3) Staff

Basic elements of genetics and cell reproduction, deterministic models of gene frequency; the Hardy-Weinberg law; effects of mutation, migration and selection on gene frequency; multiple loci and multiple allele models. inbreeding: Fisher's fundamental theorem of natural selection; stochastic models of changes in gene frequency, including methods of direct produci branching processes and diffusion equation methods. (Academic year

155 **Introduction to Probability** (3) Shumway

Probability distribution, Bayes' theorem and postulate, mathematical ex- pectation, laws of large numbers. Prerequisite: one entrance unit in algebra.

157–58 **Introduction to Mathematical Statistics** (3–3) Dirkse

Distribution theory, sampling theory, estimation, hypothesis testing, re- gression analysis, experimental design. Prerequisite: differential and in- tegral calculus. (Academic year)

159 **Principles of Bayesian Statistics** (3) Staff

Lecture (3 hours), laboratory (1 hour). Probability as a measure of uncertainty of knowledge; concepts and techniques of Bayesian inference. Prerequisite: 3 semester hours in introductory statistics, or equivalent Laboratory fee, $13. Not offered academic year 1976–77.

161–62 **Information Theory** (3–3) Staff

Elementary development of information theory and applications to com- munication, coding, psychology, linguistics, etc. Prerequisite: 3 semester hours selected from Stat 155, 157, 159, 189. Laboratory fee, $18.

165–66 **Multivariate Techniques** (3–3) Shumway

Application of multivariate statistical techniques to multidimensional re- search data from the behavioral, social, biological, medical, and physical sciences. Prerequisite: Stat 117, 157–58. Laboratory fee, $18. (Aca- demic year)

181 **Applied Time Series Analysis** (3) Shumway

Application of time series analysis to data from economics, medicine, and the physical sciences. Fourier methods in regression and analysis of variance, autoregressive and moving average models, signal discrimination and detection. Prerequisite: Stat 117, 118. Laboratory fee, $30. (Spring)

183 **Intermediate Statistical Laboratory** (3) Staff

Applications to advanced experimental design and other topics. Admission by permission of instructor. Laboratory fee, $25. (Fall or spring)

187 **Theory of Sampling** (3) Kirsch

Problems of sampling and sample design. Prerequisite: Stat 91 or equivalent. (Fall)

188 **Nonparametric Statistical Inference** (3) Lilliefors

Statistical inference when the form of the underlying distribution is unspecified. Prerequisite: Stat 91 or equivalent. (Spring)

189–90 **Mathematical Probability and Applications** (3–3) Bailar

Combinatorial analysis, conditional probability, stochastic independence, probability distributions, random variables, laws of large numbers. Prerequisite: differential and integral calculus. (Academic year)

191 **Probabilistic and Statistical Methods for Operations Research** (3) Leone

Primarily for students in the School of Engineering and Applied Science. Axiomatic theory, random variables, Bayes' theorem, some special distributions, generating functions, convergence, Poisson and Markov processes. Prerequisite: ApSc 115 or equivalent. (Fall and spring)

193 **Survey Design** (3) Kirsch

Applications of survey methodology, including questionnaire design and wording, field methods, interviewer and nonresponse biases and quality-control procedures. Problems in sample frame development. Prerequisite: Stat 187 or equivalent, and permission of instructor. (Spring)

195 **Reading and Research in Statistics** (arr.) Staff

May be repeated once for credit. (Fall and spring)

197 **Digital Computer Programming with Applications** (3) Thomas

Lecture (2 hours), laboratory (2 hours). Use of digital computer in statistical and other computational work. Writing, debugging, and running programs on the digital computer in the University Computer Center. Prerequisite: Stat 117; or Math 32; or permission of instructor. Laboratory fee, $25. (Spring)

198 **Current Topics in Computer Programming** (3) Rutiser

Concepts of programming, programming languages, operating systems, nonnumeric programming compiler techniques. Prerequisite: Stat 114 or permission of instructor. Laboratory fee, $25. May be repeated for credit. (Fall)

THIRD GROUP

201–2 **Mathematical Statistics** (3–3) Ireland

Distribution theory, sampling theory, estimation, sufficient statistics, hypothesis testing, analysis of variance, multivariate normal distribution. Prerequisite: advanced calculus. (Academic year)

205 **Data Analysis for Educational Policy Decisions** (3) Kirsch

The framing of questions of importance in educational policy and the use

of existing data bases to answer these questions. Laboratory fee. $3
Prerequisite: Stat 105 or equivalent. (Summer)

206 **Factor Analysis** (3) Kirsc
Concepts of factor analysis and their utility in various phases of researc
and related topics, including cluster analysis. Prerequisite: Stat 105 o
equivalent and permission of instructor. Laboratory fee, $18. Not offere
academic year 1976–77.

217–18 **Advanced ANOVA and Experimental Design** (3–3) Irelan
Advanced theory and application of general linear hypothesis to experi
mental designs. Prerequisite: Stat 157–58 or 201–2. (Academic year

221 **Design of Experiments for Behavioral Sciences and Education** (3) Kirsc
Applications of advanced experimental design to research problems in
behavioral sciences and education. Prerequisite: Stat 105 or 117 and
permission of instructor. Not open to graduate students in Statistics.
(Spring)

223–24 **Bayesian Inference** (3–3) Cornfield
Systematic development of Bayesian viewpoint, with applications to the
classical problems of statistics. Prerequisite: Stat 201–2. (Not offered
academic year 1976–77)

225–26 **Introduction to Biostatistics** (3–3) Cornfield
Probability models, inference, and study design as applied to biomedical
investigations. Prerequisite: Stat 201–2. (Academic year)

231 **Contingency Table Analysis** (3) Staff
A study of the theoretical bases underlying the analysis of categorical
data. Prerequisite: Stat 201–2 or 257–58. (Spring)

242 **Advanced Statistical Problems in Economic Analysis** (3) Gastwirth
Applications of advanced theory to research and decision problems in
volving economic data.

257–58 **Distribution Theory** (3–3) Gastwirth
Random variables, distribution functions, moments, sequences of random
variables, characteristic functions, special distributions, sampling theory
asymptotic distributions. Prerequisite: Stat 157–58 or 201–2. Not offered
academic year 1976–77.

259–60 **Advanced Mathematical Probability** (3–3) Staff
Measure theory, probability spaces, random variables, probability distri
butions, sequences of random variables, conditioning, martingales. Pre
requisite: Math 224 or equivalent. (Academic year)

261 **Sequential Design and Analysis** (3) Staff
Wald's theory of sequential designs, optional stopping, choice of sequential
experiments. Prerequisite: Stat 201–2. (Spring)

262 **Nonparametric Inference** (3) Lilliefors
Inference when the form of the underlying distribution is unspecified.
(Fall)

263–64 **Topics in Statistical Inference** (3–3) Lilliefors

Estimation, testing of statistical hypotheses, tests of significance, likelihood ratio, Bayesian inference and the use of prior knowledge, decision and information theory. Prerequisite: Stat 201–2 or 257–58. (Academic year)

265–66 **Multivariate Analysis** (3–3) Greenhouse

Tests of significance, homogeneity, independence, canonical and vector correlations, multivariate normal distribution, generalized Student's ratio, multivariate linear hypothesis, and analysis of variance. Prerequisite: Stat 201–2 or 257–58. (Academic year)

269 **Statistical Decision Theory** (3) Ware

(Formerly 269–70 [3–3])

Wald's theory of decision functions. Sequential analysis. Multi-decision problems. Existence theorems, complete class theorems, and other general decision theoretic results. Prerequisite: Stat 189–90; and 201–2 or 257–58. (Fall)

273–74 **Stochastic Processes** (3–3) Staff

(Formerly Markov Processes)

Fundamental notions of Markov chains and processes, generating functions, recurrence, limit theorems, random walks, Poisson processes, birth and death processes, applications. Prerequisite: Stat 189–90; and 201–2 or 257–58. Not offered academic year 1976–77.

*275 **Econometrics I: Introduction** (3) Staff

Single equation models of economic behavior. Statistical methods for testing economic hypotheses and estimating parameters. Introduction to simultaneous equations problems. Prerequisite: Stat 157–58 or equivalent, or permission of instructor. (Fall)

*276 **Econometrics II: Simultaneous Equations Models** (3) Staff

Economic models and simultaneous equations systems. Prerequisite: Stat 275. Recommended: a course in matrix theory. (Spring)

*279 **Methods in Economic Statistics** (3) Gastwirth

Applications of statistical methods to economics. Curve-fitting, regression, analysis of variance and chi-square techniques used to analyze economic data. Prerequisite: a year course in statistics. (Fall and spring)

281 **Time Series Analysis** (3) Shumway

Stationary and nonstationary time series, auto- and cross-correlation, power spectral analysis, multivariate normal processes, mean square estimation and regression, statistical inference, applications. Prerequisite: Stat 189–90 and 201–2 or 257–58. (Fall)

283 **Advanced Statistical Laboratory** (3) Staff

Application of the University computer to complex statistical problems on an individual study basis. Admission by permission of instructor. Laboratory fee, $25. May be repeated for credit only with permission of the Department. (Fall and spring)

* An interdepartmental course offered by departments of statistics and economics.

285–86 **Seminar** (3–3)
Admission by permission of instructor. (Stat 285 and 286—fall and spring)

287–88 **Modern Theory of Sample Surveys** (3–3)
Application of statistical theory to the sampling of finite populations. Simple, stratified, cluster, double and subsampling. Special topics, including super-populations and randomized response. Prerequisite: Stat 91 and Math 32 or equivalent. (Academic year)

289 **Seminar: Current Topics in Biostatistics** (3)
Discussion of selected current literature in clinical trials, epidemiology, automated diagnosis, and other topics of biomedical interest. Admission by permission of instructor. (Not offered academic year 1976–77)

295 **Reading and Research** (3)
May be repeated once for credit. (Fall or spring)

296 **Seminar: Data Analysis Methods** (3)
Case studies, data analysis procedures, and problems that a consultant might encounter. Not offered academic year 1976–77.

297 **Problems in Mathematical Statistics** (3)

298 **Seminar: Combinatorial Probability** (3)

299–300 **Thesis Research** (3–3)
(Fall and spring)

FOURTH GROUP

378 **Seminar: Topics in Econometrics** (3)
Limited to graduate students, primarily for doctoral students; offered as demand requires. A research seminar covering current econometric literature and special topics. Admission by permission of instructor.

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Urban and Regional Planning

Professors D.C. McGrath, Jr. (*Chairman*), F. Belaunde-Terry (*Visiting*)
Adjunct Professor F. Gutheim
Professorial Lecturers N. Beckman, S.J. Bellomo
Associate Professors S. Greene, S.S. Fuller

* An interdepartmental course offered by departments of statistics and economics.

Associate Professorial Lecturers S.D. MacDonald, R.M. Winick
Assistant Professor D. Gale

A program leading to the degree of *Master of Urban and Regional Planning*, which provides preparation for professional practice in the planning field, and areas of specialization in planning as components of programs leading to the degrees of *Master of Arts in Government, Master of Public Administration, Doctor of Business Administration*, and *Doctor of Public Administration*, are offered by the School of Government and Business Administration (see pages 138–72).

SECOND GROUP

153 **Principles of Urban Planning and Design** (3) Greene

Studio course for undergraduates. Basic elements of urban planning and design applied to community problems. Survey of planner's role in developing and implementing creative solutions to urban problems. (Spring)

THIRD GROUP

201 **Introduction to Urban and Regional Planning** (3) McGrath
(*Formerly Introduction to Urban Planning*)

Introduction to history, concepts, and activities of urban and regional planning. Discussion of trends in urbanism and the influences of technology and social change. (Fall and spring)

202 **Urban Planning Theory** (3) Gale

Development of the fundamental theories and concepts of urban growth and change, urban social structure and change, theories of the planning process, and the role of politics in the planning process. Prerequisite: U&RP 201 or permission of instructor. (Spring)

203 **Fundamentals of Urban Design** (4) Greene

Planning and design studio to develop and apply planning methods and graphic techniques, principles of land use and urban design; analysis of factors affecting community development and change. Open only to candidates for the degree of Master of Urban and Regional Planning. Laboratory fee, $15. (Fall)

204 **Urban Development Planning** (3) Greene
(*Formerly four credits*)

Planning and design studio: investigation of social, environmental, and technological factors in planning. Application of comprehensive planning process to typical problems of community growth and development. Prerequisite: U&RP 203 or permission of instructor. Laboratory fee, $15. (Spring)

205 **Urban Housing** (3) Fuller

Examination of the housing problem: housing market characteristics, analytical techniques, national needs, costs, financing federal programs, technology, rehabilitation, and policy formulation. Prerequisite: U&RP 201. (Fall)

206 **Community Facilities Planning** (3) Fuller

Planning implications of essential public facilities which comprise com-

munity infrastructure. Emphasis on developing an understanding of t special design, service, and locational requirements of each class of com munity facility, the relationships among facilities, and their effects o urban development and the community at large. Prerequisite: U&RP 2 or permission of instructor. (Spring)

207 **Land Development Planning** (3) McGra

Selected problems in urban and regional planning: applications of zon ing, urban renewal, and special programs available for the implemen tation of development plans. Prerequisite: U&RP 201 or permission o instructor. (Spring)

208 **Urban Transportation Planning** (3) Winn

Relationships between land use and the movement of goods and peopl in urban areas. Transportation planning principles, policy problems methods for analyzing demand and systems for urban travel; roles o public agencies and private interests in the planning and development o various modes. Prerequisite: U&RP 201. (Fall)

209 **Urban Transportation Models** (3) Bellom

Consideration of land use activity, trip generation and distribution, en vironmental impact, and modal choice models, traffic assignment, and decision-making techniques. Review of detail studies, calibration, inter actions, applications, and accuracy limitations of various mathematical models. Prerequisite: U&RP 208 or permission of instructor. (Spring

210 **Urban Development Economics** (3) MacDonal

Economic forces affecting urban growth and change; relationships among cities, metropolitan areas, and regions in the context of the national economy; socioeconomic implications of urban land development policies basic studies and methods of economic analysis. Prerequisite: Econ 21 18 or equivalent; U&RP 201. (Spring)

213 **Social Factors in Urban Planning** (3) Gal

Consideration of the impact of social groups, social class, and socia institutions on urban structure; development of techniques for reflecting social variables in the planning process. Prerequisite: U&RP 201 or per mission of instructor. (Fall)

215 **Advanced Planning Problems** (4) McGrath and Staf

Investigation of complex problems of the metropolitan region, analysis of findings, formulation of proposals, and presentation of material b faculty and cooperating groups. Multidisciplinary team and individu planning projects. Studio course. Prerequisite: U&RP 204. Laborator fee, $15. (Fall)

218 **Metropolitan and Regional Planning** (3) Fuller and Staf

Multidisciplinary study of the methods of regional analysis and proces of regional planning; development of projects of regional scale requiring problem analysis, synthesis, and plan formulation. Studio course. Pre requisite: U&RP 204 or permission of instructor. Laboratory fee, $1 (Spring)

232 **Urban Environment and the Planner** (3) Fulle

Exploration of the relationship between man and his urban environment emphasis on the role of the urban planner. Theory, research, planning

methods, current issues, and laws examined. Prerequisite: U&RP 201 or permission of instructor. (Spring)

240 **Federal and State Urban Policy Development** (3) Beckman

Investigation of contemporary trends in the evolution of federal and state governmental functions and programs affecting urban growth and development policy. Planning functions in the evolving relationships among units of federal, state, and metropolitan agencies. Prerequisite: U&RP 201 or permission of instructor. (Fall)

'277–78 **Historic Preservation** (3–3) Gutheim

The preservation movement and its literature. Review of current experience, preservation practice and techniques. Emerging aspects of historic preservation. Examples of historic, cultural and humanistic values affecting preservation activities. (Academic year)

290 **Special Topics in Urban and Regional Planning** (3) Staff

Experimental offering; new course topics teaching methods. May be repeated once for credit. (Fall or spring)

295 **Research Methods** (3) Staff

Directed research and investigation of special problems in community development. May be repeated once for credit. (Fall and spring)

298 **Directed Readings and Research in Urban and Regional Planning** (3) Staff

(Fall or spring)

299 **Thesis Seminar** (3) Fuller

Examination of thesis standards, research philosophy and methodology. (Fall and spring)

300 **Thesis Research** (3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Business Administration or Doctor of Public Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Business Administration or Doctor of Public Administration candidates. May be repeated for credit. (Fall and spring)

Women's Studies—Graduate Study

Visiting Associate Professor E. Reuben (*Director*)

* Joint offering of the departments of history and of urban and regional planning and the American Studies Program

COMMITTEE ON WOMEN'S STUDIES

T.Z. Lavine, R.H. Osborn, S.L. Simons, M.E. Tidball

The Graduate School of Arts and Sciences offers an interdisciplinary progra leading to the degree of Master of Arts in Special Studies with a concentration Women's Studies, directed by the Committee on Women's Studies and drawing up faculty from various departments within the university and resource persons the community.

Women's studies seeks to examine and integrate the contributions of establish academic disciplines to an understanding of the historical and contemporary role a status of women, and to provide a framework for the development of feminist search and analysis. Each student will work closely with an advisor in designi a program to meet individual research interests and professional goals. Prospectiv candidates should consult with the director of the Women's Studies Program.

Master of Arts in Special Studies with a concentration in Women's Studies. Prerequisite: a bachelor's degree from an accredited college or university. Studen are expected to have completed the prerequisites to graduate courses.

Required: the general requirements, pages 95–102. The program of study co sists of 36 semester hours, with or without a thesis, including a majority of a proved courses in the arts and sciences with no more than one-third taken in a one field. WStu 220 and 221 are required courses for all students; WStu 283 and 295 are required for students *not electing* a thesis; WStu 299–300 is required for those *electing* a thesis. All candidates are required to pass a Master's Comprehensiv Examination. There is no tool requirement.

THIRD GROUP

220 **Perspectives on Women** (3) Staf
(Formerly Selected Topics on Women)
Research and theory from the following: anthropology, economics, his tory, literature, philosophy, physiology, psychology, sociology. (Fall

221 **Research Issues in Women's Studies** (3) Staf
(Formerly Seminar: Women in Perspective)
Socialization and the educational system, work and the economy, sexuali and the family, health and life cycle issues. Problem identification in thes and other areas; introduction to current research. Prerequisite: WStu 22 (Spring)

225 **Feminist Theory** (3) Bunc
Theoretical foundations of feminism in the U.S. Theories and propos for change currently espoused. Although focus is primarily on feminis of contemporary white America, some Third World and European thoug will be considered. (Fall and spring)

235 **Counseling and Career Development of Women** (3) Osbor
Multidimensional analysis of factors, theories, problems and practices career development and its relationship to counseling women. (Fall

241 **Women and the Law** (3) Bloomfie
Examination of status of women in selected areas of law. Emphasis o marital status, employment, media, education, health services, crime a the Constitution. (Fall and spring)

245 **Women and Government: Federal** (3) Murphy

Power structures and their relationships in the bureaucracy of federal government and within party structure, interest groups and the private sector will be analyzed along with the extent of their influence (or lack thereof) on public policy-making as it affects women. (Fall)

246 **Women and Government: State and Local** (3) Murphy

Problems and institutional frameworks of state and local governments. Development of basic pattern of analysis which can equip the policy-maker with strategic principles applicable to any locality. (Spring)

251 **Women, Literature and the Arts** Reuben

Woman as subject and object. Examination of stereotypes, themes, language, patterns and symbolism in works by and about women. Particular attention to the woman as artist and the development of feminist criticism. (Spring)

260 **Women in the American Work Force** (3) Zangrando

Multidisciplinary analysis of the role of women in the labor force, and historical changes in that role. Societal view of women's work in the home and outside it; inter-relationships of women in and out of the work force; women's contributions, traditionally and during national crises; class, race and ethnic differences. (Fall)

270 **Seminar: Selected Topics** (arr.) Staff

280 **Independent Study** (3) Staff

283 **Practicum in Women's Studies** (3) Staff

Study of the changing status of women through supervised assignment to public and private agencies engaged in education, counseling, political action and research.

284 **Practicum** (arr.) Staff

295 **Independent Research in Women's Studies** (arr.) Staff

299–300 Thesis Research (3–3) Staff

Zoology

See "Biological Sciences."

FACULTY AND STAFF OF INSTRUCTION

Columbian College of Arts and Sciences

Graduate School of Arts and Sciences

School of Education

School of Government and Business Administration

School of Public and International Affairs

EMERITI

Caroline Lander Adams, *Professor Emeritus of Botany*
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Errett Cyril Albritton, *Professor Emeritus of Physiology*
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Dr.Ing. 1933, Institute of Technology, Berlin

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Ph.D. 1923, University of Würzburg

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C.P.A. 1923, State of Illinois

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B.A. 1927, M.A. 1929, Duke University; Ph.D. 1935, Pennsylvania State University

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Donnell Brooks Young, *Professor Emeritus of Zoology*
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ACTIVE*

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* The University Faculty is composed of the President of the University, the Vice President for Academic Affairs, the Director of Admissions, the Registrar, the University Librarian, the Treasurer, the Director of the Student Health Service, and the membership of the several college and school faculties.

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Joseph Aschheim, *Professor of Economics*
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B.S. in Ed. 1939, State University of New York at Buffalo; M.A. 1954, Catholic University of America; M.A. in Ed. 1956, Ed.D. 1962, George Washington University

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B.A. 1944, Vassar College; M.A. 1946, Vanderbilt University; Ph.D. 1958, University of Minnesota

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B.A. 1969, University of Maryland; M.A. 1971, Pennsylvania State University

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B.J. 1958, M.A. 1968, University of Missouri-Columbia

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APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of The George Washington University as soon after order is restored as is practicably possible.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

* The University Senate has been renamed the Faculty Senate.

† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established with the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.†

* Amended January 18, 1973.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals

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MAY 1977

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JUNE 1977

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JULY 1977

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August 26–27	Orientation for 1st-year students *Thursday–Friday*
August 30	Registration for all medical students *Monday*
August 31	Classes begin *Tuesday*
November 24	Thanksgiving recess for undergraduates and 1st- and 2nd-year medical students begins after last class *Wednesday*
November 29	Classes resume *Monday*
December 17	Winter recess for undergraduates and all medical students begins after last class *Friday*
January 3	Classes resume for all medical students *Monday*
January 11	Registration for spring semester *Tuesday*
January 20	Inauguration Day (holiday) *Thursday*
February 21	Winter Convocation (holiday) *Monday*
March 25	Spring recess for undergraduates and 1st- and 2nd-year medical students begins after last class *Friday*
April 4	Classes resume for undergraduates and 1st- and 2nd-year medical students *Monday*
April 22	Spring recess for 3rd-year medical students begins after last class *Friday*
May 2	Classes resume for 3rd-year medical students *Monday*
May 20	Last day of spring semester classes *Friday*
May 23–26	Examination period *Monday–Thursday*
May 27	Commencement *Friday*

* This Calendar is subject to change. Although registration is conducted in both September and January, there is no precise date for the end of the fall semester; some courses end before the winter recess while others begin before the January registration. See the *School of Medicine Schedule of Classes* for exact time of course offerings.

THE UNIVERSITY

HISTORY AND ORGANIZATION

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period,

the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. Within a few squares are the White House, the Department of the Interior, the State Department, the World Bank, and many other governmental offices and international agencies. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine and Health Sciences, Engineering and Applied Science, Education, Government and Business Administration, and Public and International Affairs; the College of General Studies; the Division of University Students; the Division of Experimental Programs; and the Summer Sessions.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools. The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board. The Department of Chemistry is on the approved list of the American Chemical Society.

The School of Medicine and Health Sciences has had continuous approval by the Council on Medical Education of the American Medical Association and the Association of American Medical Colleges. The Doctor of Medicine degree of the School of Medicine and Health Sciences is recognized by all state and territorial medical licensure boards in the United States.

UNIVERSITY POLICY ON EQUAL OPPORTUNITY

In accordance with the stated policy of its Board of Trustees and in conformity with federal laws and regulations, the George Washington University does not discriminate against any person on the basis of sex, race, color, religion or national origin in any of its education or employment programs or activities. Federal regulations implementing Title IX of the Education Amendments of 1972 call for an explicit statement that the requirement not to discriminate on the basis of sex extends to employment in and admission to such programs and activities.

Inquiries concerning the application of this policy and federal laws and regu-

lations concerning discrimination in education or employment programs and activities may be addressed to the Office of the University's Coordinator of Equal Opportunity Programs or to the Director of the Office of Civil Rights of the Department of Health, Education, and Welfare.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

The Center Governing Board, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. This Board works closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

RECREATION

The Nation's capital provides abundant recreational resources, a large number of which are available at little or no cost. There are numerous art galleries, museums, concert halls, theaters, swimming pools, parks, and places of great historic interest. Social activities are provided by student organizations of the University, the School of Medicine and Health Sciences, and University-sponsored programs such as intramural sports, concerts, recitals, and dramatic productions. Religious faiths are well represented in the Washington metropolitan area. Washington is one of the most colorful cultural and scientific centers of the world.

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* Alumni trustee.

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THE SCHOOL OF MEDICINE AND HEALTH SCIENCES

OFFICERS OF ADMINISTRATION OF THE MEDICAL CENTER

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Office of Academic Affairs

The Office of Academic Affairs bears the responsibility for the curriculum; student affairs, including scholarship and financial aid; research and sponsored programs; allied health programs; educational evaluation; admissions; and support services of the library and audio-visual and animal facilities.

Lawrence Thompson Bowles, M.D., Ph.D., *Acting Dean for Academic Affairs and Associate Dean for Curricular and Student Affairs*
Fred Leonard, Ph.D., *Associate Dean for Research*
Michael McCally, M.D., Ph.D., *Associate Dean for Allied Health Programs*
Robert Keimowitz, M.S., M.D., *Assistant Dean for Admissions and Director of Admissions (M.D. Program)*
Winfield Harker Scott, Ph.D., *Assistant Dean for Education and Director of Education*

Office of Administrative Affairs

The Office of Administrative Affairs is responsible for the administration of the University Hospital and Clinic, for support services to the School of Medicine and Health Sciences, and for the financial management of the Medical Center.

Philip Stanley Birnbaum, M.S. in M.E., B.C.E., *Dean for Administrative Affairs*
Thomas James Carroll, B.A., *Director of Financial Services*
Bruce Johnson Dietz, B.A., M.S., *Director of Management Information*
Donald Chester Novak, B.S., M.B.A., *Administrator of the Medical Center*

Office of Clinical Affairs

The Office of Clinical Affairs is responsible for the patient care activities of the University Hospital and Clinic and for the supervision of the graduate and continuing medical education programs and community affiliation programs.

Ronald Paul Kaufman, B.S., M.D., *Dean for Clinical Affairs*

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HISTORY

The School of Medicine and Health Sciences of George Washington University has a distinguished history that goes back more than a century. In March, 1825, the School opened with the intention of building "a medical school commensurate with the progress and demands of a rising metropolis, and the improvement of service throughout the country." The School, the eleventh oldest medical school in the country, has met this responsibility by providing its students with a foundation in the medical sciences upon which they have built medical careers in practice, teaching, research, or administration.

In 1844, the School took on a new dimension when Congress granted it the use of the Washington Infirmary. Thus one of the earliest general teaching hospitals in the Nation was established in Washington.

The distinguished history of the George Washington University School of Medicine and Health Sciences closely parallels academic advances and medical progress of the Nation. The School has contributed to both.

The George Washington University Medical Center, established in 1966, consists of Walter G. Ross Hall, which houses the School of Medicine and Health Sciences; the Paul Himmelfarb Health Sciences Library; the University Hospital; the H.B. Burns Memorial Building, which houses the University Clinic; the Helen L. and Mary E. Warwick Memorial Building; and affiliated hospitals.

In 1973, with the introduction of undergraduate programs in Allied Health Sciences, the name of the School was officially changed from the School of Medicine to the School of Medicine and Health Sciences.



The Medical Center's computerized axial x-ray scanner was one of the first installed in the United States. The machine performs non-invasive, low radiation tomograms, or sections, of the brain.

Regulations

A student enrolled in the University is required to conform to the following regulations and to comply with the rules and regulations of the college, school, or division in which he is registered.

A student who withdraws or is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue scholastic work only under the regulations and requirements in force at the time of return.

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, the student's registration may be cancelled. If such falsification is discovered after the student has established an academic record at the University, the student may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Faculty) for subsequent registration in the University.

Academic Dishonesty

The University community, to fulfill its purposes, must establish and maintain guidelines of academic behavior. All members of the community are expected to exhibit honesty and competence in their academic work. Incoming students have a special responsibility to acquaint themselves with, and make use of, all proper procedures for doing research, writing papers, and taking examinations.

Members of the community will be presumed to be familiar with the proper academic procedures and held responsible for applying them. Deliberate failure to act in accordance with such procedures will be considered academic dishonesty. Acts of academic dishonesty are a legal, moral, and intellectual offense against the community and will be prosecuted through the proper university channels.

Copies of the University policy on academic dishonesty can be obtained from the following offices: all department chairmen, all academic deans, and the Vice President for Academic Affairs.

University Policy on the Release of Student Information

The Family Educational Rights and Privacy Act of 1974 applies to institutional policies governing access to and release of student education records maintained by educational institutions which are recipients of Federal funds. The University complies with this statute, which states, in part, that such institutions must:

1. afford students access to education records directly related to them;
2. offer students an opportunity for a hearing to challenge such records as inaccurate, misleading, or otherwise inappropriate; and
3. receive the student's written consent before releasing information from his or her education records to persons outside the University, except for directory information as indicated below. Personally identifiable information may be furnished to a student's parents without such written consent only upon certification of the student's financial dependency.
4. comply with judicial order or lawfully issued subpoena to release a student's record notifying this student of the action.

The University will release the following directory information upon request: ldress; telephone number; dates of attendance; school, college, or division of rollment; field of study; credit hours earned; degrees earned; and honors re-ived. A student who does not wish such directory information released must e written notice to this effect in the Office of the Registrar.
University guidelines on the release of student information may be obtained om the Office of the Registrar.

ght to Dismiss Students

he right is reserved by the University to dismiss or exclude any student from e University, or from any class or classes, whenever, in the interest of the stu-nt or the University, the University Administration deems it advisable.

ght to Change Rules

he University and its various colleges, schools, and divisions reserve the right modify or change requirements, rules and fees. Such regulations shall go to force whenever the proper authorities may determine.

ght to Make Changes in Programs

he right is reserved by the University to make changes in programs without otice whenever circumstances warrant such changes.

cently Established Regulations

n Appendix (pages 272–74) contains regulations recently approved by the niversity's Board of Trustees.

e Libraries

udents have the privilege of using the University Library and the School of edicine and Health Sciences Library. The stacks are open, and all students welcome to browse at their leisure. A card denoting approved enrollment r the current semester must be presented when books are borrowed for out-de use.
All students using the libraries are expected to be familiar with the regula-ons governing their use, which are available at each library.

operty Responsibility

he University is not responsible for the loss of personal property. A "Lost and ound" Office is maintained on campus in the Safety and Security Office.

Student Affairs

he Office of the Vice President for Student Affairs develops student life pro-ams, policies, and procedures to complement the University's formal instruc-on program. These activities are implemented through the offices of the

Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Educational Opportunity Program, Housing, International Students, Student Activities, Student and Alumni Career Services and Student Health Service. More detailed information on these and other activities is contained in the *Student Handbook*.

Student Health Service

The Student Health Service is an outpatient clinic designed to assist students registered on campus with their health needs. It is located at 935 22nd St. N.W. (in the H.B. Burns Memorial Building).

Physicians and physician assistants are available by appointment from 9 a.m. to 4:45 p.m., Monday through Friday. In addition, physician assistants are available for primary care and triage to walk-in patients Monday through Friday from 5 to 6:45 p.m. and on Saturday from 9 a.m. to 12 noon.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed connection with the University is ineligible for medical benefits of the Student Health Service. Any student who so desires may engage physicians and nurses of his or her own choice, but the student will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, x-ray work, laboratories and referrals to specialists or other outside physicians) are the responsibility of the student.

Health and Accident Insurance

The Student Health Service has arranged for and endorsed group health and accident insurance, on an elective basis, for those full-time students who do not have other coverage. Students are encouraged to carry adequate health insurance coverage for themselves and, if married, for their spouses and children. Interested students should contact the Student Health Service Office.

Physical Examinations

All first-year students are required to have a comprehensive physical examination prior to admission to the School of Medicine and Health Sciences. The students are informed of significant findings and advised regarding such measures as will tend to help them maintain a high standard of health.

Residence Halls

Complete information concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20052. Information concerning off-campus housing may be obtained at this Office and at the Office of the Dean for Academic Affairs. Reservations for private housing must be made by students.

Munson Hall Apartments

Munson Hall is a University-owned and operated apartment house containing 15 one-bedroom and 54 efficiency apartments. Graduate and married students are eligible to reside in Munson Hall. Those wishing to apply for an apartment should contact the Housing Office for a waiting list application. All leases are for 12 months.

Housing for Undergraduate Allied Health Students

Admission to the University does not include a room reservation. The student will receive, with notification of acceptance, University residence hall information, an application for residence hall space and a declaration of intent to attend the University. The application for residence hall space must be accompanied by a $100 *nonrefundable deposit*. The housing deposit is credited toward the first semester's room charge. Rooms are leased for the academic year, September to May, and lease payment must be made by June 30 for the fall semester. Physician assistant and nurse practitioner applicants are not encouraged to apply for University housing in view of their extended academic year.

1976–77 RESIDENCE HALL RATES PER PERSON FOR TWO SEMESTERS*

For Men:	
Calhoun Hall	
double room	$1,075
triple room	1,025
For Women:	
Strong Hall	
single room	1,125
double room	1,075
triple room	1,000
For Men and Women:	
Crawford Hall (limited to sophomores, juniors and seniors)—double room	1,050
Mitchell Hall (limited to sophomores, juniors and seniors)—single room	1,150
Madison Hall	
double room	1,075
triple room	1,000
Thurston Hall	
double room, triple room, large room for four	1,075
suite for six	1,000

FOOD SERVICE

Resident allied health students in the freshman and sophomore years are required to participate in the food service plan. Freshmen must participate in the seven-day, 20 meals per week plan, at the rate of $800† for the academic year.

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* Residence hall rates subject to change.
† Food service prices subject to change.

Sophomores may elect either the 20-meal plan or a five-day meal plan, 15 meals Monday through Friday, for $750* for the academic year. Each plan is optional for allied health juniors, seniors and for medical students. Food service payment does not cover University intersession or vacation periods. All meal cards admit bearer to the dining room in Thurston Hall and the second floor contract dining room in the Cloyd Heck Marvin Center.

Veterans Education

The veterans counselor in the Office of the Registrar, Luther Rice Hall, 21st & Eye St., N.W., assists students entitled to educational benefits as veterans, widows, or children of deceased or totally disabled veterans with any problems which may arise concerning their benefits. This Office also processes certification of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or dependents of veterans should consult with the veterans counselor prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 941 N. Capitol St., Washington, D.C. 20421.

Facilities

Walter G. Ross Hall

Walter G. Ross Hall was dedicated and opened in May, 1973. This modern facility provides the teaching and laboratory facilities for students in the School of Medicine and Health Sciences. It occupies a city block of Washington on the northwest edge of the University campus, and its gross area is approximately 550,000 square feet, more than 10 acres. The building is equipped with modern audio-visual and other teaching equipment as well as basic science laboratories.

Office of Education

The Office of Education comprises a group of core facilities and services supportive of the educational, clinical and research missions of the Medical Center. Coordinated through the Assistant Dean for Education, the four divisions of the Office of Education are the Office of Audiovisual Education, the Office of Computer-Assisted Education, the Division for Evaluational Services and the Paul Himmelfarb Health Sciences Library.

The Office of Audiovisual Education and Services, Frank Allen, Ph.D., Director.—This office aims to enhance learning in the Medical Center with audiovisual technology. Consultation is provided in the use of nonprint media

* Food service prices subject to change.



A student studies in the Audiovisual Center of the Paul Himmelfarb Health Sciences Library.

in educational, clinical and research programs. The office provides displays of audiovisual materials and programs in classrooms, in the Audiovisual Study Center of the Himmelfarb Library and throughout the Medical Center. It has highly developed production capabilities which are available to students and faculty. They include photographic, illustration, cinematographic and television studios, and a print shop which serve the Medical Center community. Virtually all learning spaces at the Medical Center are equipped for still and motion projection and television display. Those spaces subject to frequent use are equipped with permanent systems for projection, sound amplification and recording designed to support staff and student presentations.

Computer-Assisted Education and Services, Charles Tidball, M.D., Ph.D., Director.—This office provides training in computer literacy and delivery of computer-based learning materials. Other services include scoring of examinations, maintenance of academic records, computing in support of research projects, data acquisition, statistical analysis and text processing. The office maintains hardware and software support for computer-based learning material developed by faculty and students of the Medical Center. It functions as an interface for the delivery of material from other computer-assisted educational programs—notably Massachusetts General Hospital and Ohio State University—through the Health Educational Network, Inc. Cooperative programs with the National Institutes of Health and the National Library of Medicine provide access to additional computerized data bases.

Division for Evaluational Services, Winfield Scott, Ph.D., Director.—The primary task of this division is to work with faculty and students toward the improvement of educational programs. It provides consultation to faculty in support of efforts to maximize opportunities for learning. It conducts evalua-

tions of courses and other curriculum components and works toward the establishment of effective systems for evaluating student performance.

Paul Himmelfarb Health Sciences Library, Nina W. Matheson, Director.—Located adjacent to Ross Hall, the Paul Himmelfarb Health Sciences Library provides 30,000 square feet to house a capacity of 80,000 volumes. Seating is available to approximately 400 users. Space available includes smoking lounges, group study rooms, audiovisual viewing rooms, a typing room and individual study carrels. The Audiovisual Study Center is equipped with the most recent and up-to-date resources and facilities, including videotape monitors, terminals for accessing computer-aided instructional programs, slide-tape recorders and rear-view slide projection units. The collection of more than 60,000 volumes and 1,400 journal subscriptions is enhanced by extensive non-print audiovisual media which are both commercially and locally produced. Together these provide the foundation for the delivery of a number of special information services. The Network for Continuing Medical Education program provides loans of videotapes to individuals who cannot attend the regularly scheduled viewings. As a designated National Library of Medicine Medline Center, the library offers computer-based bibliographic research services such as Medline, Toxline and Cancerline. Staff may request monthly selective dissemination of information searches from this data base. Search capability on other data bases such as Science Citation Index, Psychological Abstracts and Biological Abstracts are being implemented. Materials not available in its own collection will be borrowed to meet user needs.

Through both formal and informal means, the library staff instructs its clientele on the effective use of materials and services. An active participant in the National Library of Medicine's Regional Library Communications Network, the library is involved in regional planning and policy making.

The George Washington University Hospital

This 550-bed hospital, including the Eugene Meyer Pavilion, is adjacent to the School of Medicine and Health Sciences. It is the primary clinical teaching facility for the students and for a large house staff. It is fully approved and accredited by the American Medical Association, the American Hospital Association, the American College of Physicians, and the American College of Surgeons, through the Joint Commission for the Accreditation of Hospitals. Annual patient admissions number approximately 20,000.

The Watson Wise Emergency Pavilion of the Hospital logs in approximately 40,000 patient visits annually and is one of the city's most active emergency units.

The University Hospital is equipped to serve 16 specialty fields. Complex teamwork procedures such as renal dialysis, a computerized X-ray unit for diagnosing brain diseases, cardiac catheterization, open-heart surgery, transplant surgery, and total hip replacements are included in its activities. Facilities include a surgical suite of 10 rooms, two of which are equipped with overhead galleries where observers may communicate with the surgical teams, observe the electronic patient-monitoring system in action, and view the intricate surgical procedures below.





Top: Walter G. Ross Hall, the School's basic science building. In the foreground is the Paul Himmelfarb Health Sciences Library. Bottom: A view of the George Washington University Hospital showing the Emergency Room entrance.

The Helen L. and Mary E. Warwick Memorial Building

This building houses a computerized multitest facility that is available to physicians for patient evaluation.

The University Clinic

The Clinic is housed in the 13-story H.B. Burns Memorial Building, where ambulatory care is consolidated and integrated w hin the teaching program. The academic group practice of physicians in general medicine and more than 20 specialists is based in the Burns Building. Visits of ambulatory patients number approximately 90,000 annually.

Affiliated Hospitals

Children's Hospital National Medical Center.—Children's, one of the finest pediatric health care centers in the country, houses 220 inpatient beds, including a specialized referral intensive care nursery and an adolescent unit. Its ambulatory Diagnostic and Treatment Center handles in excess of 120,000 visits a year. Children's is the major base for the School of Medicine and Health Science's Department of Child Health and Development, and for the assigned pediatric clerkship. A variety of elective opportunities are offered in various aspects of child health.

Columbia Hospital for Women.—This hospital, situated two blocks from the University Hospital, is utilized by medical students for training in obstetrics and gynecology. Columbia Hospital for Women is an affiliated hospital for residency training in Obstetrics and Gynecology in the George Washington University Medical Center Program.

Fairfax Hospital.—This 530-bed voluntary community teaching hospital serves a burgeoning surburban area and provides all clinical services including psychiatry. Each year more than 20,600 patients are admitted, 4,900 babies delivered, 15,000 surgical operations performed, and 49,200 persons examined and treated in the Emergency Suite. Fairfax Hospital offers a rotating internship program, a School of Medical Technology, and clinical facilities for a School of Practical Nursing. Students of the School of Medicine and Health Sciences serve at this hospital in clinical clerkship and elective programs. Fairfax Hospital is an affiliated hospital for residency training in Obstetrics and Gynecology in the George Washington University Medical Center Program.

Holy Cross Hospital.—Holy Cross, a modern 338-bed hospital, is a primary clinical campus which provides students with first-hand exposure to the practice of medicine in the community. It is a private, voluntary facility in which the full range of medical, surgical, and pediatric services are provided for a growing suburban population. Last year, more than 19,000 patients were hospitalized, nearly 47,000 emergency visits were registered, and 3,263 babies were delivered at Holy Cross. The hospital, which has consistently experienced one of the highest occupancy rates in the Washington metropolitan area, is planning an expansion to include an additional 112 beds, enlarged emergency room facilities, and a new, self-contained center for in-and-out surgery.

National Naval Medical Center.—The Naval Hospital at the National Naval Medical Center, Bethesda, Md., is a 750-bed general hospital offering a wide range of specialized services, clinical research, and educational programs.



The H.B. Burns Memorial Building houses the Ambulatory Care Division of the Medical Center.

Medical care is provided to active duty and retired military members and their dependents. It is a major referral center for thoracic and cardiovascular surgery as well as for cancer therapy. The teaching staff directs a complete internship and residency program in 21 specialties.

St. Elizabeths Hospital.—St. Elizabeths Hospital, established by an act of Congress in 1855, is a federal psychiatric hospital administered under the Department of Health, Education, and Welfare. This hospital provides for the treatment, care, and general well-being of approximately 6,000 patients of whom 3,400 are resident. The facility includes a completely approved General Hospital to meet the needs for medical and surgical care and functions with a full-time staff within the hospital plus attending physicians in various specialties. The hospital maintains an up-to-date medical library.

Medical students of George Washington University utilize the facilities of St. Elizabeths for clinical psychiatric training. Opportunities for research are enhanced by a cooperative arrangement with the National Institute of Mental Health of the United States Public Health Service.

Veterans Administration Hospital.—In addition to the medical, surgical, psychiatric, neurological, tubercular, and physical medicine and rehabilitation services, this 700-bed hospital has a large outpatient program; an extensive medical research program; programs in open heart surgery, cobalt therapy, and renal dialysis; a metabolic program; and a specially designed Administrative Research Laboratory.

Washington Hospital Center.—This 843-bed private, voluntary institution serves the greater Washington area through a triad of activities: patient care, teaching, and research. The Center is the tenth busiest of more than 7,000 hospitals in the United States and the second busiest private hospital in terms of inpatient admissions. A very active emergency service cares for more than 49,000 patients a year, and the 50 clinics provide all major clinical services except pediatrics for about 65,400 outpatients and 31,700 inpatients yearly. In addition to an extensive approved internship and residency program, the Center offers organized instruction for nurses, laboratory and X-ray technicians, medical secretaries, and other health-related vocations.

Committees

ADMISSIONS COMMITTEE

R. Keimowitz *(Chairman)*, M.P. Footer, F. Green, M. Gusack, S. Kirson, J. LaRosa, R.J. Neviaser, R. Noble, M.E. Tidball, G.A. Walker, B. Waxman, M. Johnson *(4th-year student)*, J. Wisoff *(2nd-year student)*, L.T. Bowles *(ex officio)*, W.H. Scott *(ex officio)*, D.H. Glew, Jr. *(Consultant)*, J. Sealy *(Consultant)*

ADVISORY COMMITTEE ON ACADEMIC AFFAIRS

P.C. Adkins, V.H. Cohn, T. Daniels, M.L. Elgart, S. Haas, S.D. Loube, A.M. Margileth, S.C. Marinoff, R. Ostroff *(4th-year student)*, D. Reiss, S.D. Rocke, D.R. Rosing, L.T. Bowles *(ex officio)*, F. Leonard *(ex officio)*, R.P. Kaufman *(ex officio)*

LLIED HEALTH COMMITTEE

I. McCally *(Chairman)*, P.S. Birnbaum, P. Jones *(physician's assistant student)*, J. Frank, L. Gintzig, S. Hammersberg, D. Hawkins, J. Hillis, J. Kleh, . Mazel, J.W. Millar, S.D. Rockoff, R.D. Shapiro, R.S. Snell, J. Wise, M. lverman, G. Merriweather, E. Ross *(ex officio)*, G. Stoner *(ex officio)*

IMAL RESEARCH COMMITTEE

L. Joseph *(Chairman)*, W.P. Fortune, R.D. Walk, K. Huang, L.W. Thompn, M. Jackson, F. Leonard *(ex officio)*, F.C. Zook

POINTMENTS AND PROMOTIONS COMMITTEE

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TINUING MEDICAL EDUCATION COMMITTEE

J. Van Houten *(Chairman)*, C.T. Bever, J.W. Canter, W.H. Cooper, D. Ein, Feitel, W. Fouty, A.M. Margileth, J.J. Rheingold, R. Saunders, J.R. Shan, E.W. Sutherland, S.J. Talpers, M. Werner, V.M. Iovine, E. Hargrove, Wipplinger, L.T. Bowles *(ex officio)*, D.S. O'Leary *(ex officio)*

UCATIONAL EVALUATION COMMITTEE

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ar student), B.W. Smith, K. Spencer *(1st-year student)*, L.T. Bowles, *(ex*
ficio), R. Keimowitz, *(ex officio)*, P. Neill *(3rd-year student)*

UCATIONAL PLANNING COMMITTEE

G. Webster *(Chairman)*, L.F. Affronti, G. Avery, A. Breslow, O.W. Donnelly, Enders, M. Gusack, H. Jason, P.I. Kenmore, R.A. Kenney, J. Sheagren, Mandel, T.E. Piemme, R.S. Snell, N. Tsangaris, G.V. Vahouny, A.C. man, C.B. Robinowitz, W.S. Yamamoto, L.T. Bowles *(ex officio)*, W.H. on *(ex officio)*, R. Friedman *(2nd-year student)*, H. Reis *(1st-year student)*, Weaver *(4th-year student)*

EXECUTIVE COMMITTEE OF THE MEDICAL CENTER

D. Davis, B. Epstein, R.A. Kenney, S.D. Loube, H.G. Mandel, R.S. Snell, A. Weingold, M. Armaly, R. Maunder *(3rd-year student)*, W. Marshall, J.F. Mermel, *(ex officio)*, R.P. Kaufman *(ex officio)*, P.S. Birnbaum *(ex officio)*, L.T. Bowles *(ex officio)*

GRADUATE EDUCATION PLANNING COMMITTEE

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RADIATION AND RADIOISOTOPE COMMITTEE

K. Weaver *(Chairman)*, N. McElroy, M. Bailey, D.H. Glew, Jr., H.C. Harder, S. Heller, J.G. Maier, D. Rae, S.D. Rockoff, V. Varma, M. Werner, B.C. Zook, D. Goodenough

RESEARCH COMMITTEE

C.R. Treadwell *(Chairman)*, G.S. Edwards, M.J. Jackson, W.L. Joseph, S.G. Kent, G. Massaro, B. McClennan, H. Stevens, A.E. Parish, P.O. Periman, H.V. Pipberger, M. Reich, D. Reiss, M.J. Stern, B. Rabkin *(3rd-year student)*, F. Leonard *(ex officio)*

STUDENT ADVISORY COMMITTEE

L.T. Bowles *(Chairman)*, P. Bash *(2nd-year student)*, D. Maunder *(3rd-year student)*, M. Hersler *(1st-year student)*, J. Gittleson *(1st-year student)*, P. Epstein *(2nd-year student)*, R. Hales *(3rd-year student)*, R. Ostroff *(4th-year student)*, B. Cowden *(allied health student)*, A. Weaver *(4th-year student)*, D. Rochester *(allied health student)*, R.P. Kaufman, M. McCally, F.F. Mermel, W.H. Scott

Alumni and Allied Associations

THE GENERAL ALUMNI ASSOCIATION

THE OBJECTIVES OF THIS ASSOCIATION are to unite graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the University and left the University in good standing, or any person who is or has

been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those eligible members who are current contributors (dues or otherwise) to or life members of the George Washington University General Alumni Association, the Alumni Association of any school of the University, or contributors to the Annual Support Program.

The Alumni Office is in Alumni House, 714 Twenty-first Street, N.W., Washington, D.C. 20052. All alumni are urged to keep the Alumni Office informed of changes of address or occupation and to supply information with regard to their fellow alumni.

THE GEORGE WASHINGTON UNIVERSITY MEDICAL ALUMNI ASSOCIATION

THE GEORGE WASHINGTON UNIVERSITY Medical Alumni Association, incorporated in 1959, continues the organization previously known as the George Washington University Medical Society.

The stated purposes of the Association are as follows: "This shall be a nonprofit organization international in scope, whose objectives shall be to provide constructive services for the M.D. degree alumni of the George Washington University School of Medicine and Health Sciences for furthering the art and science of medicine, research, and for the promotion of the welfare of the George Washington University School of Medicine and Health Sciences, its students, the George Washington University Hospital and its trainees."

Active membership in the Association consists of all M.D. degree graduates of the School of Medicine and Health Sciences; current members and, on application, past members of the teaching staff of the School of Medicine and Health Sciences, who hold doctoral degrees; Doctors of Medicine who have had one or more years of postgraduate training in the George Washington University Hospital. Junior membership consists of all members of the student body of the M.D. degree program of the School of Medicine and Health Sciences.

The Medical Alumni Association maintains an office in the School of Medicine and Health Sciences.

Officers for 1975–76

President—John F. Mermel, M.D. 1960
President Elect—Dee Parkinson, M.D. 1943
First Vice President—Sidney Levine, M.D. 1941
Second Vice President—William Stuart Battle, M.D. 1967
Secretary—Harry Beaver, M.D. 1963
Treasurer—William Thompson, M.D. 1967
Council:

Harvey Ammerman, M.D. 1943
James P. Burns, Jr., M.D. 1949
Marvin Footer, B.A. 1938, M.D. 1942
Donald Glew, Jr., M.D. 1948
Thomas Goodridge, M.D. 1965
Stanley Kirson, B.A., M.D. 1957
Samuel Loube, B.A. 1941, M.D. 1943

John Lyles, M.D. 1970
Alvin Parrish, M.D. 1945
Gordon Smith, M.D. 1943

The Doctor of Medicine Degree Program

ADMISSION

THE GEORGE WASHINGTON UNIVERSITY School of Medicine and Health Sciences seeks to enroll intellectually gifted, humanly sensitive, mature persons who will excel in the science and art of medicine. Applicants of diverse social and educational backgrounds have access to the admissions process. In the selection process there is no discrimination because of sex, race, color, religion, or national or regional origin.

Entrance Requirements

ADMISSION TO THE FIRST-YEAR CLASS

For admission to the Doctor of Medicine degree program, a minimum of 90 semester hours must have been earned in an accredited American or Canadian institution of higher learning. Credits earned in a professional school can be



A second-year medical student explains Medical Center procedures to a first-year student during orientation.

pplied to the fulfillment of this minimum requirement only if they are accept-
ble by the applicant's college or university toward a bachelor's degree in arts
r science. (A credit under the quarter system is two-thirds of a semester hour.)
t is advantageous to complete four full years of undergraduate study. Only ex-
eptional students are accepted upon completion of the minimal requirements.
It is possible for exceptional students with three years of undergraduate work
n Columbian College of George Washington University to be admitted to this
nedical school and to receive a combined Bachelor of Arts-Doctor of Medicine
egree. More detailed information on this program is given on page 31.

The following courses must be completed with satisfactory achievement be-
ore the applicant can be certified for matriculation. All required science
ourses must include sufficient laboratory work to give assurance of familiarity
ith the experimental methods and techniques of the disciplines.

1. **Biology:** 8 semester hours, including 2 semester hours of laboratory. This
ay be either in general biology or zoology but may *not* include separately
redited courses in botany.

2. **Chemistry:** 8 semester hours of general inorganic chemistry (which may
nclude qualitative analysis), including 2 semester hours of laboratory; 6 to 8
emester hours of organic chemistry, including laboratory.

3. **Physics:** 8 semester hours, including at least 2 semester hours of labora-
ory.

4. **English:** 6 semester hours in composition and literature. This may be the
sual introductory college course or its equivalent.

The number of required courses has been kept to a minimum in order to
llow college students the time to pursue their own interests in depth. The
dmissions Committee has no preference with regard to the major area of
tudy of the applicant. Students with backgrounds in the arts, humanities, and
ocial sciences are as admissible as applicants with science backgrounds. The
ommittee does expect that work in the student's chosen area of concentration
s well as in the required science courses should reflect scholarly interests and
how evidence of significant achievement.

DMISSION WITH ADVANCED STANDING

General Requirements.—Advanced standing application can be made for
ransfer into the second or third year programs. No applications will be ac-
epted for the fourth year program. The applicant must be or have been regis-
ered in an accredited school of medicine. He or she must be in good standing
nd eligible to continue in the school where currently enrolled or eligible to
e-enter the former medical school if his or her education has been interrupted.

All applicants, except those presently enrolled in Doctor of Medicine degree
rograms in U.S. or Canadian medical schools, are required to pass satisfac-
orily each relevant subsection of the National Board of Medical Examiners
est. American students enrolled in foreign medical schools must apply to take
his test under the auspices of the Coordinated Transfer System (COTRANS)
f the Association of American Medical Colleges. Applicants not enrolled in
U.S. or foreign Doctor of Medicine degree programs can petition the Office
f Admissions for sponsorship for the National Board of Medical Examiners
est. This petition must be received no later than March 1, 1977.

Requirements for Admission to the Second Year.—The applicant must ha completed a course of study at least equivalent to that required of medi students at this University for advancement to the second year. Course wo in anatomy, biochemistry, microbiology and physiology must have been co pleted at an accredited medical school. Applicants who are not matriculat at a U.S. or Canadian medical school must pass the National Board of Medi Examiners subtests in these areas. It is also advisable that the applicant ha experience in or knowledge of normal psychological development, epidemiolo and statistics.

Requirements for Admission to the Third Year.—The applicant must ha completed a course of study at least equivalent to that required of medi students at this University for advancement to the third year. Course work anatomy, biochemistry, microbiology, physiology, pharmacology, patholo physical diagnosis and clinical assessment must have been completed at accredited medical school. The applicant must pass each of the subtests in cluded on the Part I examination given by the National Board of Medi Examiners. Applicants should have completed a course of study similar content to the interdisciplinary Clinical Sciences program required of second year medical students at this University (see page 30). This program co sists of four courses, Idis 201, Path 201, Phar 201 and Pchi 201, and cover didactic work in varying clinical medicine areas and practical work in clinic evaluation of patients.

Application Procedure

APPLICATION TO THE FIRST-YEAR CLASS

The School is a participant in the American Medical College Application Ser ice (AMCAS). Applications for a place in the first-year class can be obtained only from AMCAS, 1776 Massachusetts Avenue, N.W., Suite 301, Washington D.C. 20036. When completed, this application is returned to AMCAS for di tribution to schools selected by the applicant. The AMCAS application dead line is November 15, 1976.

After receipt of our copy of the AMCAS application, the Office of Admi sions will send applicants a Supplemental Application. This requests informa tion not included on the AMCAS application. Submission of this supplemental application (due no later than December 31, 1977), including the nonrefundable supplemental application fee ($25), will initiate Admissions Committee processing of the application. On the basis of the available information some applicants will be asked to have letters of evaluation (recommendation) sent After careful review of these documents the Committee will extend an invitation for interview to the most promising candidates. When these steps are completed the application will be brought to the Admissions Committee for final decision Applicants will be informed of final decisions immediately. Although it does not assume an obligation to report missing or erroneous credentials, the Admissions Office will try to contact the applicant if it is noted that necessary credentials are missing.

This institution also participates in the AMCAS Early Decision Program Interested applicants for the 1977–78 entering class are referred to the AMCAS "Information Booklet" included with the AMCAS application materials. Early decision applicants should be aware that they must submit their application by

August, 1976, and that for consideration, the supplemental application and all letters of recommendation and transcripts must be received by the Office of Admissions no later than September 1, 1976. Decisions on early decision candidates are made usually by October 1 and no later than October 15.

Applicants are referred to the AMCAS "Information Booklet for the 1977–78 Entering Class" and to the admissions brochure prepared specifically for applicants and available from the Office of Admissions for the most up-to-date information available at the time of application. Details included in those sources supersede information contained herein.

APPLICATION WITH ADVANCED STANDING

Applications for admission with advanced standing should be obtained from the Office of Admissions (M.D. Program), School of Medicine and Health Sciences, 2300 Eye Street, N.W., Washington, D.C. 20037.

All applicants must complete an advanced standing application form and submit it with a $25 application fee no later than June 1, 1977.

The dean of the school in which the applicant is enrolled must submit a letter of recommendation stating that the applicant is eligible to continue in that school, the reasons for transfer and an overall evaluation of the student. Letters of recommendation are also required from a member of the school's basic science faculty and from either a member of a different basic science department or from someone who is personally aware of those characteristics of which the applicant wishes the Admissions Committee to be aware.

Official transcripts of the applicant's record must be sent from each institution attended since high school. Students enrolled in foreign medical schools must include certified copies and a translation of their medical school records with their applications.

Applicants who are accepted must have final official transcripts sent to this University prior to matriculation here.

The most recent application information will be made available at the time an applicant requests his application. That information will supersede information contained herein.

Selection Procedures

To process the vast number of applications to this institution fairly and expeditiously, a screening evaluation system is utilized. This evaluation procedure screens applicants on the basis of undergraduate grades (taking into account improvement in performance in later years), Medical College Admission Test scores, and pertinent extracurricular and work experiences. Some additional consideration is given to applicants from the District of Columbia and the neighboring metropolitan area, as well as to applicants from George Washington University. Although there are no age limits, the very young and relatively older applicants must demonstrate considerable strength in other aspects of their applications.

When all credentials and interview reports are available, the application is reviewed by the entire Admissions Committee. In this review, although grades and MCAT scores are considered, major consideration is given to the essay portions of the applications, the letters of recommendation, and the interview reports, in

an attempt to assess those motivational and personal characteristics that the Committee feels are so important in choosing future physicians.

Applicants who are offered a place in the class are required, within two weeks to notify the Office of Admissions (M.D. Program) of the School of Medicine and Health Sciences in writing of their intent to accept the places reserved for them. A deposit of $100 is also required by a specific date after notification of acceptance. The date will be given in the notice of acceptance. The deposit becomes nonrefundable two weeks prior to registration but will be credited toward the first semester's tuition.

PROGRAM OF STUDY

The faculty and administration of the School of Medicine and Health Sciences have developed a curriculum designed to prepare each student for a professional life of continuous learning. Because students differ in background, ability, and career interests, the curriculum is balanced with required courses and students are encouraged to maximize achievement within their own limits. It is presumed that all graduates will seek additional education in graduate training programs before assuming complete responsibility for independent clinical decision-making.

In the first year, the student concentrates primarily on basic sciences, beginning with an orientation in cell biology taught by members of all basic science departments. The remainder of the first semester includes anatomy, and biochemistry. In the second semester, the student concentrates on physiology and microbiology in addition to an integrated course in neurobiology.

The second year integrates basic science and clinical information. Pathology and pharmacology provide the major basic science substrates. This academic program has been evolving since 1970 and several innovations have been introduced each year. The course is coordinated by a program director. Integration is accomplished through the work of faculty subcommittees working with the program director and the second year subcommittee on educational planning. Medical students are introduced to physical diagnosis during the first semester of the second year.

A two-year continuum of required clerkships and elective sequences is designed to bring the student to optimal readiness for graduate training which begins in the third year. Clerkships are required in medicine, surgery, pediatrics, obstetrics-gynecology, psychiatry, and health care sciences. A great variety of elective experience is available at George Washington and its affiliated hospitals, and permission may be obtained to take electives away from the George Washington campus.

During the entire educational experience, students are encouraged to assume responsibility for their self-assessment and continued learning. It is the goal of the faculty to select and educate concerned human beings who will function productively and effectively for a long career in medicine.

DEGREE REQUIREMENTS

Every candidate for graduation with the degree of Doctor of Medicine must have satisfactorily completed the requirements of the School of Medicine and

Health Sciences as described on page 30, including no less than four academic years of study as a matriculated student in medicine. All required courses must be completed and all prescribed examinations satisfactorily passed.

HONORS

Candidates who have completed the four-year course for the Doctor of Medicine degree and have received the grade of *H* (Honors) in courses totalling 50 per cent or more of the total number of semester hours taken may be recommended by the Executive Committee of the Medical Center for graduation "With Distinction."

COMBINED DEGREE PROGRAMS

Combined Bachelor of Arts and Doctor of Medicine

To be recommended for the degree of Bachelor of Arts, the candidate must complete at least 94 semester hours of prescribed college work (at least 30 hours and one year of residence must be completed in Columbian College of Arts and Sciences) and the first year of the medical curriculum. Upon satisfactory completion of the fourth year of the medical curriculum the student becomes eligible for the degree of Doctor of Medicine.

It should be understood, however, that admission to Columbian College does not guarantee admission to the School of Medicine and Health Sciences.

Combined Master of Science and Doctor of Medicine

The departments of the School of Medicine and Health Sciences cooperate with the Graduate School of Arts and Sciences in offering programs leading to the combined degrees of Master of Science and Doctor of Medicine in the fields of anatomic pathology, biochemistry, genetics, microbiology, mycology, pharmacology, and physiology.

Students in the School of Medicine and Health Sciences who wish to apply for the combined degrees of Master of Science and Doctor of Medicine must meet the requirements for admission to the Graduate School of Arts and Sciences. They must be recommended by the chairman of the department and by the Dean of the Graduate School of Arts and Sciences and the Dean for Academic Affairs of the Medical Center.

The Master of Science degree program consists of a minimum of 30 semester hours which includes a thesis (equivalent to 6 semester hours). For a Master of Science degree program which does *not* include a thesis, the number of semester hours of graduate course work is determined by the department. The program without the thesis is not an individual student option and is not available in every department.

A maximum of 12 semester hours of credit for graduate-level courses *completed as a part of the Doctor of Medicine degree* (and not already applied toward the bachelor's degree) will be allowed in fulfillment of the requirements of the Master of Science degree. The remaining semester hours of work, includ-

ing a thesis if it is required, must be in course work in the basic medical sciences normally required for a Master of Science degree in the Graduate School of Arts and Sciences.

Dual Program for the Doctor of Medicine and Doctor of Philosophy Degrees

In cooperation with the Graduate School of Arts and Sciences a dual program is available to qualified students who seek both the Doctor of Medicine and Doctor of Philosophy degrees. The requirements which must be fulfilled for both degrees are identical to those currently and separately established in the School of Medicine and Health Sciences and the Graduate School of Arts and Sciences.

To enter the dual degree program, a prospective student first must apply for and gain admission to both the Graduate School of Arts and Sciences and the School of Medicine and Health Sciences separately through established procedures. Upon admission to both schools, the student may then apply for affiliation with the dual degree program. Work toward the Doctor of Philosophy degree is performed under the jurisdiction of a *departmental* doctoral committee and is available in more than 50 research fields.

A student working toward these degrees may apply a maximum of 24 semester hours of approved work taken in the M.D. degree program of the School of Medicine and Health Sciences toward the total of 72 semester hours required to complete the requirements for the Doctor of Philosophy degree. Twenty-four hours of this requirement must be earned in graduate courses during periods when the student is not obligated to full-time enrollment in the M.D. degree program, i.e., during summer sessions, vacation periods, etc. The final 24 semester hours of dissertation research toward the Doctor of Philosophy degree may begin concurrently with the final semester of graduate course work. The estimated time for completion of this dual program is six years.

Master of Science and Doctor of Philosophy Requirements

The detailed requirements for the degrees of Master of Science and Doctor of Philosophy are stated in the *Undergraduate and Graduate Catalogue* of the University, which is available at the Graduate School of Arts and Sciences, George Washington University, Washington, D.C. 20052.

REGISTRATION

Registration for the 1976–77 fall semester will be conducted from 10 a.m. to 2 p.m., on August 30. The place of registration for the fall semester as well as the time and place of registration for the spring semester and the summer session of fourth-year clerkships will be announced in the *Schedule of Classes*.

FEES AND FINANCIAL REGULATIONS FOR M.D. CANDIDATES

The following fees have been established for the academic year 1976–77:

Application fee	$25.00
Tuition fee, for the academic year for 2nd-, 3rd- and 4th-year medical students	5,500.00
Tuition fee, for the academic year for 1st-year medical students	7,000.00
University Center fee, charged all students (except those granted "leave of absence" status) each semester	50.50
Late registration fee, for failure to register within the designated period	15.00
Late payment fee, charged for failure to make payments when due (see "Payment of Fees," below)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," below)	35.00
Continuous Registration fee, charged each student granted "leave of absence" status for each semester in the School of Medicine and Health Sciences	98.00
University Center fee, charged each student granted "leave of absence" status, each semester	5.00
Graduation fee	25.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds or for any other reason	15.00
Transcript fee, for each transcript of record	2.00
If two or more transcripts are requested at the same time, fee for the first two copies is $2 each, fee for each additional copy	.50
Replacement of lost or stolen picture identification card	2.00

Payment of Fees

The annual fee for the 1976-77 academic year is payable in two equal installments on or before registration day for each semester. Students registered for the summer session of fourth-year clerkships will be on "continuous registration" without charge until the following fall semester. No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees are payable at the Office of the Cashier of the University. Checks and postal money orders should be made payable to George Washington University, with student identification number shown in upper left-hand corner.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. While tuition is due and payable in full as described above, students may sign a deferred payment contract with the Student Accounts Office at the time of registration permitting them to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 27, 1976 (for the fall semester), and March 9, 1977 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $2,500 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically

charged a $15 late payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits rights to the use of the deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

After entering the course of instruction the student is obligated for the tuition for the full semester. A student registered for the clerkships of the summer session is obligated for tuition due at the time of registration for the following fall semester, except that in the case of withdrawal or leave of absence a *pro rata* payment will become due immediately.

Acceptance by the University of a student's fees does not in any way obligate the School of Medicine and Health Sciences to accept the student for any subsequent semester or summer session, and the right is reserved to require the withdrawal of any student whenever, in the interest of the student or the School, the Executive Committee of the Medical Center deems it advisable to do so.

Cost of Textbooks and Student Equipment

The minimum cost of necessary textbooks and student equipment (microscope, drawing materials, glass slides, clinical thermometer, stethoscope, hemocytometer, uniforms, etc.) is approximately as follows: first year, $700; second year, $400; third year, $200; and fourth year, $200. Microscopes must be provided by the student. Rentals are not available.

Prepaid and Deferred Payment Plans

Several commercial programs for those who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Street, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

REGULATIONS FOR M.D. CANDIDATES

Attendance

A student is not permitted to attend classes until registration has been completed and fees due have been paid. Regular attendance is required.

Grades

H—Honors; *P*—Pass; *F*—Failure; *IP*—In Progress; *I*—Incomplete; *W*—Withdraw.

Those students whose performances in a subject, as determined by the department concerned, are of a very high caliber, and who, in addition, have demonstrated those qualities of intellectual curiosity, integrity, and self-discipline which clearly set them apart from the majority of the group, may be assigned the grade of *H* (Honors).

The grade of *P* (Pass) will be assigned to all students who meet the minimum standards of performance in a subject as determined by the department concerned, unless they are entitled to the grade of *H* (Honors).

The grade of *F* (Failure) will be assigned when a student fails to meet the minimum standards of performance in a subject as determined by the department concerned. Students who receive the grade of *F* in any subject may not advance to the work of the following year until they have complied with such recommendations of the Committee on Educational Evaluation as are approved by the Executive Committee of the Medical Center.

The grade of *IP* (In Progress) will be assigned to students in courses which require more than one semester for completion. A single definitive grade will be assigned upon completion of the entire course in a subsequent semester.

The grade of *I* (Incomplete) will be assigned when a student fails to complete all the required work in a course for reasons acceptable to the Associate Dean for Curricular and Student Affairs. A student in the first and second year may not proceed into the work of the following year until a grade of *I* has been removed; if not removed, a grade of *I* will be automatically changed to a grade of *F* (Failure) after one year. A student in the third or fourth year must remove a grade of *I* prior to graduation.

The grade of *W* (Withdraw) will be assigned only when a student is unable to continue in school for reasons acceptable to the Associate Dean for Curricular and Student Affairs (such reasons may *not* include poor scholarship). Such a student may be readmitted, at the discretion of the Associate Dean for Curricular and Student Affairs, within a period of two years, and may repeat for credit the course or courses in which the grade of *W* had been assigned.

Auditing

A student may, with the permission of the instructor, register as an "auditor" in a class (no academic credit). An auditor is not required to take active part or to pass examinations. A student who takes a course as an auditor may not later repeat it for credit.

Probation

A student who receives grades of *F* in courses totalling 6 or more semester hours in one semester will be placed on academic probation for the following semester. A student who while on probation receives a grade of *F* in any course will be continued on probation for the following semester.

Academic Dismissal

A student (1) who exceeds three semesters, consecutive or otherwise, on probation; or (2) who receives grades of *F* in courses totalling 14 or more semester hours in any academic year; or (3) who receives grades of *F* in courses totalling more than 20 semester hours of work in the M.D. degree program; or (4) whose academic achievement is otherwise considered unsatisfactory by the Educational Evaluation Committee will not be allowed to continue in the M.D. degree program.

Examinations

Examinations, which may be written, oral, or practical, will be held during and/or at the end of each semester.

Graduation

Application for Graduation.—Application for graduation must be filed in the Office of the Dean for Academic Affairs, and the fee must be paid at the time of registration for the last semester of the fourth year.

Presence at Graduation.—A candidate is required to be present at the graduation exercises unless written application for graduation *in absentia* is approved by the Dean for Academic Affairs.

FINANCIAL AID

The following fellowships, scholarships, and loan funds are available to students in the School of Medicine and Health Sciences. Unless otherwise specified, inquiries should be directed to the Financial Aid Office of the Medical Center, George Washington University, 2300 Eye Street, N.W., Washington, D.C. 20037.

Fellowships

Wilbur J. and Edith K. Carr Memorial Fellowship Fund (1965).—By bequest of Edith K. Carr, former Trustee of the University. The income from this fund provides fellowships in surgery, medicine, or medical research at the George Washington University Hospital.

Samuel Jordan Graham Fellowship in Surgery (1961).—By bequest, in memory of Judge and Mrs. Graham. The income from this fund, up to $2,000, may be used to assist students who are pursuing postgraduate study or research, preferably in surgery, at the School of Medicine and Health Sciences.

If no individual is conducting such work or deserving of the award, the income may be used to provide one or more scholarships (to cover tuition and other school expenses deemed appropriate) for students in the School of Medicine and Health Sciences. Application should be filed with the Chairman of the Department of Surgery no later than March 1.

The Lattman Foundation.—Each year the Foundation provides a sum of money to support academic enrichment programs for students who are experiencing academic difficulty.

Robin Miller Research Fellowship (1953).—A $3,000 fellowship established by bequest of Mrs. Robin Miller for the study of cardiovascular diseases.

Henry Rau Foundation Student Fellowship Grant (1967).—Awarded annually to a student in the School of Medicine and Health Sciences for research in cancer and allied diseases at the George Washington University Clinic.

U.S. Public Health Service Training Grants.—Information concerning training grants in fields of the medical sciences is available at the Office of the Dean for Academic Affairs of the Medical Center.

Scholarships

Scholarships awarded to students in the M.D. degree program are credited for the academic year unless otherwise specified. Each holder must carry a full schedule of academic work during the period for which the scholarship is awarded. Applicants should apply on prescribed forms which must be filed in the Financial Aid Office of the Medical Center no later than March 15 preceding the academic year for which the scholarship is to be awarded.

Achievement Rewards for College Scientists (ARCS) Foundation, Inc., Scholarship.—Awarded to a student on the basis of financial need and superior grades. Candidates must be citizens of the United States.

Armed Forces Health Professions Scholarship Program (1972).—Available to members of the armed forces who qualify under Public Law 92–426. Interested individuals should write to one of the following: (1) Department of the Army, DASG-PTP, Washington, D.C. 20314; (2) Bureau of Medicine and Surgery, Navy Department (Code 3174), Washington, D.C. 20372; (3) ATC/RSOS, Randolph Air Force Base, Texas 78148.

Anna Bartsch Hospital Intern Scholarship (1946).—A partial scholarship established by Dr. Anna Bartsch-Dunne as a memorial to her mother. Awarded to a woman intern in the University Hospital.

Dr. Edith SeVille Coale Scholarships (1965).—Provided at the request of Dr. Coale for women in the School of Medicine and Health Sciences. The scholarships are administered by the Zonta Club of Washington. Application should be made to the Financial Aid Office of the Medical Center no later than December 1.

Joseph Collins Foundation Scholarships (1951).—Available to medical students upon application through the Financial Aid Office of the Medical Center.

Joan Luria Hines Scholarship (1968).—Established by friends, students, and faculty of the School of Medicine and Health Sciences as a memorial to the life of a medical student.

The Garfield and Rose Kass Medical Scholarship (1975).—Awarded on the basis of need to a worthy student in the School of Medicine and Health Sciences.

Ki-Wives of Washington Scholarship Fund (1958).—Three tuition scholarships available to students in the School of Medicine and Health Sciences.

Sidney A. Levine Scholarship Fund (1971).—Established to assist medical students on the basis of need and academic performance.

Medical Student Research Scholarships and Traineeships.—For student participation in the research programs of the School of Medicine and Health Sciences or special training in research methods. Research scholarships are ordinarily awarded for full-time activity during the summer months; research traineeships support part-time work during the academic year. Scholars are

"matched" with members of the faculty in accordance with their mutual inte
ests. Trainees are designated by the departments responsible for the program
These programs have been spsonsored by the National Institutes of Health.
addition a number of research scholarships have been made available throu
the Washington Heart Association.

School of Medicine Scholarship Fund

Scholarship aid is awarded from income on endowments that have been estab
lished by gifts from various donors for tuition awards to students in the Scho
of Medicine and Health Sciences. Listed belov are the endowments that sup
port the School of Medicine Scholarship Fund:

Anna Bartsch Scholarship Fund (1946).—Established by Dr. Anna Bartsch
Dunne as a memorial to her mother. Awarded to a woman in the School
Medicine and Health Sciences "of outstanding scholarship, character, an
promise, who intends to make the practice of medicine her life profession."

Jack I. Bender Scholarship Fund (1967).—Established by the family of Jac
I. Bender as a memorial to their father. Awarded annually to a student on th
basis of academic performance and need.

Everett Lamont Bradley Scholarship Fund (1954).—By bequest of Alice R. F
Bradley in memory of her son, for a student in the School of Medicine an
Health Sciences.

Oliver C. Cox Scholarship Fund (1973).—Established in memory of Dr
Oliver C. Cox, "for the establishment, support and maintenance of endowe
scholarships in medicine."

David Perry Steinman Memorial Scholarship Fund (1960).—Established b
friends and classmates. Awarded annually to a second-year student in th
School of Medicine and Health Sciences on the basis of need and academ
performance.

James J. Whisman Scholarship Fund (1966).—By bequest of James J. Whis
man for needy and deserving students in the School of Medicine and Healt
Sciences.

Columbian Women Scholarship Funds

The Columbian Women Scholarships are awarded to women students on th
basis of financial need and scholastic attainment. Candidates must have com
pleted a minimum of 15 hours at this University with a minimum *B* (3.0
average, or the equivalent. A letter of application for these scholarships shou
be addressed to the Chairman, Columbian Women Scholarships, care of th
Alumni Office, George Washington University, Washington, D.C. 20052, n
later than May 15 for the fall semester, and January 1 for the spring semester
Scholarship aid is awarded from income of the following endowments:

Estelle M. Corbett Scholarship Fund (1973).—A fund of $1,000 for tuitio
aid.

Jessie Fant Evans Scholarship Fund (1967).—A $10,135 fund for tuition a
established by bequest of Jessie Fant Evans, former Trustee of the Universit

Lewes D. and Myrtie H. Wilson Memorial Scholarship Fund (1926).—
fund of $1,000 for tuition aid, established by Elizabeth Wilson as a memori
to her parents.

Loan Funds

American Medical Association Medical Education Loan Guarantee Program (1960).—Available to medical school students (beyond the first semester of the M.D. degree program).

Catherine Breen Student Loan Fund (1972).—Established by alumni of the School of Medicine and Health Sciences in honor of Catherine Breen, former Assistant to the Dean of the Medical Center. Available to needy students who are candidates for the degree of Doctor of Medicine. Applications should be made to The George Washington University Medical Alumni Association.

Edith K. Carr Medical School Loan Fund (1962).—Established by Mrs. Carr for loans to students in the School of Medicine and Health Sciences.

Health Professions Student Loan Program.—This fund is available to a full-time student pursuing a course of study leading to the degree of Doctor of Medicine. Interns, residents, students engaged in premedical or other professional training, and students enrolled in programs of study other than those leading to the degree mentioned above are *not* eligible for these loans.

A candidate must (1) be a citizen of the United States or have such immigration status and personal plans as to indicate an intention to become a permanent resident of the United States, (2) be in need of the amount of the loan to be able to pursue the course of study, and (3) be in good standing with the School. Inquiries concerning deadlines and applications should be directed to the Financial Aid Office of the School of Medicine.

Jessie B. Martin Loan Fund (1967).—Established by friends of Jessie B. Martin, former Editor of Academic Publications at the University. An emergency fund for loans up to $200, payable prior to ceasing of enrollment, with interest rate of 3 per cent per annum. Application should be made to the Director of the Office of Student Financial Aid of the University.

School of Medicine Emergency Loan Fund

Established by gifts from various donors to provide temporary loan support to students who must have funds to meet an urgent and unexpected financial obligation. Below are listed the donors whose gifts comprise the School of Medicine Emergency Loan Fund:

Edith K. Carr Fund (1962).—Established by Mrs. Carr.

Joseph H. Himes Fund (1956).

W.K. Kellogg Fund (1942).—Established by the W.K. Kellogg Foundation in Battle Creek, Mich.

Pfizer Fund (1953).—Established by Chas. Pfizer & Co., Inc.

Ethel L. Murray Fund (1951).—By bequest from the estate of Ethel L. Murray.

Strauss Medical School Loan Fund (1975).—Created by gift from the Lewis and Rosa Strauss Memorial Fund, Inc. in memory of the Honorable Lewis L. Strauss.

Sutherland Fund (1941).—Established by Rose L. Sutherland.

W.E. Wrather Fund (1967).—Established by Alice D. Wrather in memory of her husband.

PRIZES

Janet M. Glasgow Award of Outstanding Achievement, American Medi Women's Association, Inc.—Awarded annually if the student standing first the graduating class is a woman.

American Medical Women's Association, Inc. Scholarship Achievem Citation.—Awarded annually to those female students who are consider "honor graduates" when ranked against all other students in the graduat class.

Samuel M. and Miriam S. Dodek Prize (1967).—Established in memory Professor Bernhard Zondek, the eminent discov rer of the endocrinology of human female reproductive cycle. Awarded annually to a member of the grad ating class who has attained a commendable knowledge and understanding the field of female endocrinology.

Allie S. Freed Prize (1957).—Awarded annually to a member of the gradua ing class who has demonstrated exceptional proficiency in the field of preventiv medicine.

Walter Freeman Prize (1966).—Awarded annually to a student in the gra uating class who submits the best essay based on original investigation.

Alec Horwitz Prize (1959).—A prize of $100 awarded annually to a seni who has demonstrated exceptional proficiency in the field of surgery.

Oscar Benwood Hunter Prize (1952).—Established by The George Washing ton University Medical Society, now known as The George Washington Univer sity Medical Alumni Association. Awarded annually to a member of the grad ating class who has demonstrated outstanding ability in pathology.

Jacobi Medical Society Prize (1962).—Established in memory of Dr. Abraha Jacobi, the founder of pediatrics practice in the United States. Awarded annu ally to a member of the graduating class who has demonstrated outstandin ability in pediatrics.

Howard Kane-A.F.A. King Obstetrical Society Prize (1937).—Established memory of Dr. Howard Kane and Dr. A.F.A. King, who served as Professor in the School of Medicine and Health Sciences. Awarded annually to a mem ber of the graduating class who has demonstrated outstanding ability in obste rics and gynecology.

Lange Medical Publications Prize.—Awarded annually to two members the graduating class who are considered outstanding by their classmates. Th prize consists of the graduate's choice of four books published by Lange Medi cal Publications.

Huron W. Lawson Prize (1957).—A prize of $100 established by Mrs. Law son in memory of her husband, who was a distinguished member of the Medic Staff of the University, presented annually to a member of the graduating clas who has demonstrated exceptional proficiency in the field of obstetrics an gynecology.

Benjamin Manchester Prize (1966).—Established by a grateful patient honor of Dr. Benjamin Manchester, clinical professor of medicine. Awarde ed annually to a member of the graduating class who has an outstanding recor and shows promise of real humanitarianism in the practice of medicine.

C.V. Mosby Book Prize.—Awarded annually to four members of the gradua ing class who are considered outstanding by their classmates. The prize consis of the graduate's choice of a book published by C.V. Mosby Company.

Julius S. Neviaser Prize in Orthopaedic Surgery (1956).—A prize of $100 awarded annually to the senior who scores the highest grade in a written examination and clinical aspects of orthopaedic surgery.

John Ordronaux Prize (1907).—By bequest, $150 awarded annually to the member of the graduating class who has the highest scholastic standing

Roche Prize.—An Omega watch and a scroll awarded annually to the member of the graduating class who best exemplifies the ideals of the modern American physician. The winner is chosen by vote of the graduating class.

William G. Schafhirt Prize (1966).—By bequest, $200 awarded annually to a senior student for the best original essay or thesis on some medical subject of current public interest.

Upjohn Achievement Prize.—A prize of $200 and an inscribed plaque awarded annually to a member of the graduating class selected by his or her classmates on the basis of outstanding scholastic and personal achievement.

HONOR SOCIETIES

Alpha Omega Alpha.—National Honor Medical Society. Third- and fourth-year candidates for the M.D. degree meeting the qualifications specified by the constitution of the Society are eligible for election to membership.

William Beaumont Medical Society.—Medical students showing unusual ability for medical writing and research are elected by the active members of this society.

Howard Kane-A.F.A. King Obstetrical Society.—The fifteen third- and fourth-year candidates for the M.D. degree who maintain the highest grades in their work in obstetrics are eligible for membership.

Smith-Reed-Russell Society.—M.D. degree candidates of the third and fourth years who have received the grade of *H* (Honors) in courses totaling 40 per cent or more of their total semester hours are eligible for membership.

MEDICAL ETHICS FORUM

The Medical Ethics Forum is a student-founded organization which sponsors an informal series of seminars. Speakers are invited to discuss current ethical questions with which students and doctors are confronted in medical practice and research. In addition, the Forum sponsors symposia to evaluate more thoroughly particularly seminal issues.

Undergraduate Programs in Allied Health Sciences

PROGRAMS OF STUDY in the allied health sciences at the School of Medicine and Health Sciences include those disciplines and skills that are allied to medicine in the delivery of health care and health education. The faculty of the School recognizes that modern medical practice requires increasing numbers of non-physician health care professionals; that such allied health personnel are appropriately educated in an academic health center; and that new roles for health

care providers require the introduction of new curricula in allied health and nursing education.

The purpose of the School's allied health program is to meet the health needs of our community and our society by training appropriate personnel, and to meet the needs of the student who has chosen a career in the health sciences area by providing programs that combine effective training leading to professional skill and competence with sound education leading to continued personal and professional development.

Programs in Allied Health Science are currently offered leading to the degrees of (1) Associate in Science, with areas of concentration in Medical Laboratory Technique, Medical Services Technology, Nuclear Medicine Technology and Radiologic Technology; and (2) Bachelor of Science in the fields of Medical Technology and Radiologic Sciences and Administration, or with designation as Physician's Assistant, Nurse Anesthetist and Nurse Practitioner.

Certificates are also awarded in the Medical Technology, Physician's Assistant, Nurse Anesthetist and Nurse Practitioner programs.

ADMISSION

The right is reserved to refuse admission to any student with an academic record which creates doubt of ability to succeed in college, or who, for any other reason, would not be an acceptable student. In the selection process, there is no discrimination because of sex, race, color, creed, or national or regional origin.

An application for admission to degree candidacy should be accompanied by a nonrefundable $10 application fee.* The application fee is waived for students applying for readmission who were registered as degree candidates at the time of their last registration at this University and who have not since registered at another institution.

Applicants should submit the application form and complete credentials by June 1. Some programs may require an earlier admissions date.

Forms for application for admission or readmission are available at, and should be returned to, the Office of Admissions, George Washington University, Washington, D.C. 20052.

Admission to Degree Candidacy

The following are required for admission to degree candidacy in all Allied Health programs:

1. Graduates of secondary schools must have a diploma based upon an acceptable academic record from an accredited secondary school. Applicants who have not graduated from secondary school must have satisfactory scores on the General Educational Development (GED) High School Level tests.

2. Students who have completed secondary school within two years of the date of their application for degree candidacy and who have not attended any other college or university must have acceptable scores on the Scholastic Apti-

* Application fee must be by check or postal money order, payable to George Washington University.

tude Test (SAT) of the College Entrance Examination Board (CEEB)*; applicants without previous college work who have completed secondary school more than two years before their date of application may substitute acceptable scores on the College-Level Examination (CLEP) or acceptable scores on the General Educational Development (GED) High School Level test.

3. Students who have completed fewer than 12 semester hours of acceptable course work at an accredited college or university before applying for degree candidacy must have a secondary school record and acceptable scores on one of the three examinations listed in item 2 above.

4. Students who have completed 12 or more semester hours of acceptable course work at an accredited college or university must have maintained an over-all quality-point index of 2.0 in coursework; they must be in good standing as to scholarship and conduct and be eligible to return to the last previously attended institution in the same semester for which admission is sought to George Washington University. A student who has been academically dismissed or suspended more than twice is ineligible for consideration for at least five years from the date of the last suspension or dismissal.

REQUIRED CREDENTIALS

1. A transcript of secondary school work, or, for students who are not graduates of secondary schools, scores on the General Educational Development test. Transcripts must be forwarded directly from the institution attended to the



A physician's assistant student and a pediatrician test a child's motor development.

* The College Entrance Examination Board test is preferred; however, the American College Testing battery (ACT) scores will be accepted.

Office of Admissions. A transcript submitted directly by the student is not a
ceptable.

2. For applicants who have attended any college, university or other ins
tution of higher learning, an official transcript forwarded to the Office of Admi
sions by each institution attended regardless of whether credit was earned o
desired.

3. Scores on standardized examinations (ACT, SAT, CLEP, etc.) forwarde
by the administering agency directly to the Office of Admissions.

4. Records from service schools.

ADVANCED TUITION DEPOSIT

After notification of acceptance, a $100 advanced tuition deposit will be re
quired of all full-time undergraduate students including those readmitted. Thi
deposit is not due until May 1 for students entering in the fall semester or unt
December 15 for students entering in the spring semester. The deposit is cred
ited toward tuition and is not refundable.

Admission as a Nondegree Student

A student who wishes to take individual courses in allied health programs
without applying for degree candidacy must apply for admission to the Univer
sity as an undergraduate unclassified student in the School of Medicine and
Health Sciences. The Associate Dean for Allied Health and the chairman of the
department offering the course shall determine whether admission will be grant
ed to nondegree students. Credits earned as a nondegree student may be trans
ferred to degree programs at the University provided the course(s) are applica
ble to the desired curriculum and the student meets the requirements of the de
gree program for which application is made.

Advanced Standing

Advanced standing may be awarded for coursework taken at other accredited
institutions at the college or university level or for nontraditional classroom or
clinical experience. Students are reminded, however, that they must satisfy the
residence requirement for their degree program (see pages 57, 61) no matter
how much advanced standing may be granted.

It is the responsibility of the student to have certified official transcripts of all
coursework taken at other institutions or the results of examinations sent by the
issuing institution or agency directly to the Office of Admissions, George Wash
ington University, Washington, D.C. 20052. If the applicant has fewer than 9
semester hours of acceptable credit (grades of *C* or better on academic work
from an accredited institution) at the time the application is submitted, the ap
plicant must have the secondary school record sent directly to the Office of Ad
missions from the school.

The University reserves the right to refuse credit for transfer in part or in
whole, or to allow it provisionally. Credit so given may be withdrawn for sub
sequent poor work. No time limitation will be placed on the transfer of credits
from other institutions in the areas of human competence (language, humani
ties, social studies, mathematics) or subject competence (biological sciences

mathematics, or physical sciences which are related to allied health sciences). However, in areas of vocational competence (clinical applications as dictated by individual programs), credit will not be granted for work completed five or more years prior to application unless proficiency and/or continued maintenance of skills are demonstrated.

CREDIT FROM HIGHER INSTITUTIONS

Unlimited advanced standing may be awarded for appropriate course work completed with a minimum grade of *C* or its equivalent at other accredited institutions of higher learning, provided the course is applicable to or comparable with a course in the required curriculum, or the degree program to which the student has been admitted has provisions for elective credit toward which the credit for advanced standing may be applied. Although a grade of *D* is not acceptable for transfer, a course in which a student has received the grade of *D* may be used to satisfy a curriculum requirement. It may not, however, be counted toward the total number of semester hours required for the degree, and it may not be repeated without the approval of the faculty adviser.

CREDIT FOR NONTRADITIONAL CLASSROOM OR CLINICAL EXPERIENCE

Assuming there is no duplication of course work earned, a maximum of 60 semester hours of advanced standing may be awarded on the basis of nontraditional classroom or clinical experience, by a combination of any of the methods listed below:

Credit from Service Schools.—A limited amount of credit may be assigned for selected service school instruction received since 1941. No more than 30 semester hours may be assigned for a combination of service schools and examinations referred to above. Veterans should submit to the Office of Admissions photostatic copies of their service school records, indicating courses successfully completed with sufficient identification of the course to locate it in the *Guide to Evaluation of Educational Experience in the Armed Forces.*

Special Departmental Examinations.—A student may request any department to offer the student a special examination covering the subject matter of any specific course. Approval of such a request is not automatically granted; the student must offer evidence of sufficient occupational or educational background to indicate a reasonable command of the subject matter. A student who has previously taken examinations to waive course requirements may not subsequently take examinations for credit in the same courses. Assigning credit (or waiving a requirement) by special departmental examination will depend on the department's evaluation of the examination paper. These examinations will normally be of at least three hours' duration. A fee of $25 for each course examination is charged for preparation, administration and grading of the examination.

Credit for College Entrance Examination Board College-level Examination Program (CLEP).—(CLEP offers two types of examinations: General and Subject Examinations. CLEP General Examinations are offered in five areas: mathematics, social sciences, humanities, natural sciences, and English compo-

sition. CLEP Subject Examinations measure achievement of specific college-level courses and are offered in more than 20 subjects.)

Upon admission to degree candidacy, credit is assigned for the General Examinations, with the exception of the English composition examination, passed at the 50th percentile or above (college sophomore norms). Credit is assigned for the Subject Examinations passed at the level recommended in the College Board model policy. Credit may not be earned by passing the examination after having taken the equivalent course. Arrangements for the examinations are the responsibility of the applicant and should be made with the College Entrance Examination Board College-Level Examination Program, Box 592, Princeton, N.J. 08540.

Credit for New York State Board of Regent's Examination.—Applicants for degrees who present proper certification of award of a degree at the Associate's level from the New York State Board of Regents *may* be awarded a maximum of 60 semester hours of advanced standing.

Credit for Correspondence Courses.—A maximum of 30 semester hours of advanced standing *may* be awarded through the successful completion of appropriate correspondence courses offered by accredited colleges and universities.

Credit through United States Armed Forces Institute (USAFI) Examinations.—A maximum of 30 semester hours of advanced standing may be assigned for approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

Credit for educational programs in industrial and other noncollegiate organizations.—A maximum of 12 semester hours of advanced standing may be awarded for coursework performed in noncollegiate programs using criteria developed by the American Council on Education and the New York State Board of Regents.

Currently registered degree candidates must obtain permission from the Associate Dean for Allied Health Programs before registering to take examinations, correspondence courses or courses at other accredited institutions.

Readmission

A student previously registered in the University who was not registered during the immediately preceding semester (summer sessions excluded), must apply for readmission. The final date for applying is the same as that for new entering students (see page 42). If the student applies as a degree candidate and was previously registered as a nondegree student, or if the student has attended one or more higher institutions during absence from the University, the student must have complete official transcripts sent to the Admissions Office of this University from each institution attended. Applications for readmission are considered on the basis of regulations currently effective.

The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of the last registration at this University and who has not since registered at another institution.

Students From Foreign Institutions

Application, required records, and scores on the *Test of English as a Foreign Language* (see page 47) should be received from *foreign applicants* no later than March 1.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send *directly* to the Office of Admissions, George Washington University, Washington, D.C. 20052, official credentials listing subjects studied, grades received, examinations taken and degrees received. Certified copies of diplomas and certificates from secondary schools and all colleges and universities attended are required. Records of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

LANGUAGE TESTS

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language* (TOEFL). Students are responsible for making arrangements for taking the test by addressing inquiries to the following agencies:

1. All European countries (including Cyprus, Great Britain, Iceland, and Ireland):
   CITO
   Postbus 1034
   Arnhem, Netherlands
2. All Middle Eastern and North African countries (except Israel):
   American Friends of the Middle East
   Abou Shakra Building
   Rue Bliss (Manara)
   Beirut, 2500 Lebanon
3. Hong Kong:
   Institute of International Education
   408 J. Hotung House, Fourth Floor
   5/15 Hankow Road, Kowloon, Hong Kong
4. India:
   Bureau of Educational Research
   Ewing Christian College
   Allahabad, U.P., 211003, India
5. Republic of China:
   Language Center, 2-1, Hsu-chow Road
   Taipei, Taiwan (100), Republic of China

All other applicants should address inquiries to TOEFL, Educational Testing Service, Princeton, N.J. 08540, U.S.A. The completed application form should be returned to the appropriate agency well in advance of the beginning of the semester for which the applicant seeks admission. The test fee remitted with the application entitles the student to have the test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does not constitute application for admission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and an application blank. On the application for the test, the student should specify that the scores be sent to the Office of Admissions, George Washington University, Washington, D.C. 20052.

In addition to the TOEFL, an admitted student may be required to report to the Admissions Office to make arrangements for taking an English Placement Test for foreign students prior to registration. Results of this test will determine the courses the student will be permitted to register for in the program of study

FEES AND FINANCIAL REGULATIONS FOR UNDERGRADUATE ALLIED HEALTH STUDENTS

Fees paid by students cover only a portion of the cost of the operation of the University. Income from endowment funds, grants, and gifts from alumni and friends of the institution make up the difference.

The following fees and financial regulations were adopted for the 1976 summer sessions and the academic year 1976–77. (See page 49 for projected tuition increases for 1977–80.)

Tuition Fees

Full-time on-campus program (12 or more hours), each semester	$1,300.00
Part-time on-campus program, for each semester hour	98.00
Summer Sessions, for each semester hour	98.00

University Center Fee (charged all students registered on campus, nonrefundable)

For students registered for 11 or more semester hours on campus:	
Each semester	50.00
For students registered for less than 11 semester hours in a semester on campus:	
For each semester hour for which the student registers	4.75
For students maintaining "continuous registration" status:	
Each semester	4.75

Additional Course Fees

In certain courses offered by Columbian College of Arts and Sciences, additional fees such as laboratory and material fees, are charged as indicated in the course descriptions in the *Undergraduate and Graduate Catalogue*. These fees are charged by the semester and, unless otherwise indicated, may be defrayed in two payments when the tuition is paid in this manner. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the laboratory fee, the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Associate in Science	$10.00
Bachelor of Science	25.00

Residence Hall Fees (see page 15)

Special Fees and Deposits

Application fee	$10.00
Advanced tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student	100.00
Housing deposit, nonrefundable, charged each applicant for residence hall space	100.00
Admission tests (when required)	6.00–12.00
Late-registration fee, for failure to register within the designated period	15.00
Late-payment fee, for failure to make payments when due (see "Payment of Fees," page 50)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for non-payment of fees (see "Payment of Fees," page 50)	35.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds or for any other reason	15.00
Continuous Registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements*—due and payable on the official days of registration	98.00
For special physical examination	2.00
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25.00
For each examination to qualify for advanced standing and for each special examination	5.00
English test for foreign students (when required)	5.00
Laboratory checkout fee, for failure to check out of Chemistry laboratory by the date deadline set by the instructor†	10.00
Transcript fee, for each transcript of record	2.00
If two or more transcripts are requested at the same time, fee for the first two copies is $2 each, fee for each additional copy	.50
Replacement of lost or stolen picture identification card	2.00

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

Projected Tuition and Fee Increases 1977–80

So that students and their parents may plan more realistically for a total four-year period, tuition increases for the academic years 1977–78, 1978–79 and 1979–80 have been estimated as follows:

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*Payment of the continuous registration fee entitles the student who is granted leave of absence to return and continue work toward a degree under the academic requirements which were in force at the time of the student's first registration. The continuous registration fee applies toward neither tuition fee nor residence requirements for the degree.
This fee does not apply to students granted military leave, see page 55.
†A student who drops a chemistry course before the end of the semester must check out of the laboratory at the next laboratory period.

Increase by year (full-time undergraduate students):

1977–78	$200
1978–79	200
1979–80	200

*Increase by semester hour (graduate and part-time undergraduate students):

1977–78	$75
1978–79	75
1979–80	75

It is not possible to project future economic data with certainty. Increas outlined above are merely estimates based on present circumstances and shou in no way be interpreted as fixed limits on tuition increases. The Universi hopes to keep tuition increases as low as possible, but it is obligated to maintai a sound financial basis. Economic conditions in the recent past, particularly as they affect private educational institutions, have been extremely variable an significant increases in tuition in excess of the above limits may be require

Payment of Fees

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made payable to George Washington University, with the student identification number in the upper left-hand corner.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for six semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 27, 1976 (for the fall semester), and March 9, 1977 (for the spring semester). No deferred payment is permitted for the summer session. Interest at the rate of eight per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $618 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of eight per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered the student forfeits rights to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas and other academic

* Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

Prepaid and Deferred Payment Plans

Several commercial programs for those who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

Withdrawals and Refunds*

Applications for withdrawal from the University or for change in class schedule must be made in writing to the Associate Dean for Allied Health Programs. Notification to an instructor is not an acceptable notice (see "Withdrawal," page 14.)

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

Complete withdrawal from the University:

FALL SEMESTER

Withdrawal dated on or before September 10, 1976	90 per cent
Withdrawal dated September 13 to September 24, 1976	75 per cent
Withdrawal dated September 27 to October 8, 1976	50 per cent
Withdrawal dated after October 8, 1976	none

SPRING SEMESTER

Withdrawal dated on or before January 21, 1977	90 per cent
Withdrawal dated January 24 to February 4, 1977	75 per cent
Withdrawal dated February 7 to February 18, 1977	50 per cent
Withdrawal dated after February 18, 1977	none

For a *change in status from full-time to part-time student* or for *partial withdrawal by a part-time student*, the above schedule applies to the difference

*Regulations concerning withdrawal and refunds for the summer sessions are stated in the *Summer Sessions Catalogue*.

in charges between the original program and the adjusted program contin
ing in effect.

3. A student enrolled in an undergraduate full-time program who drops or a
a course and continues to be in a full-time program will have no financ
adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester w
receive credits for current charges in accordance with the schedule for co
plete withdrawal from the University (see No. 1 above). Payments made
excess of the nonrefundable balance will be refunded to the student. T
nonrefundable balance will be maintained as a deferred credit for use by th
student upon return to the University (see "Military Leave," page 55
5. Regulations governing student withdrawals as they relate to residence ha
and food service charges are contained in the specific lease arrangement

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In no case will tuition be reduced or refunded because of absence from classe

Payment applies only to the semester for which a registration charge is a
curred and will not be credited to another semester (exception: students granted
military leave, see page 55).

Authorization to withdraw and certification for work done will not be give
a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make
banking arrangements in the community.

REGULATIONS FOR UNDERGRADUATE ALLIED HEALTH STUDENTS

Attendance

A student may not attend classes until registration is completed and fees ha
are paid. A student may attend only those classes for which registered. Regular
attendance is expected. A student may be dropped from any course for unsatis
absence.

Scholarship Requirements

A student who fails to maintain the scholarship requirements of the School of
Medicine and Health Sciences may be dismissed from the University.

GRADES

Grades are mailed to the student through the Office of the Registrar at the close
of each semester. They are not given out by instructors.

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory;
D, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal. In certain
courses, an alternate grading system of *CR* (Credit) and *NC* (No Credit) may
be used. Except for courses which specifically state that repetition for credit is
permitted, a candidate for a degree at this University may not repeat for credit

a course in which a grade of *D* or better was received, unless required to do so by the department concerned. A written statement to this effect must be submitted to the Registrar by the appropriate department chairman.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Whenever a grade has not been assigned, the symbol *I* (Incomplete), the symbol *W* (Authorized Withdrawal) or the symbol *F* (Unauthorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given the instructor for the student's inability to complete the required work of the course. At the option of the instructor, the grade of *I* may be recorded if a student, for reasons beyond the student's control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons before the date when grades must be reported. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, the instructor may initiate an appropriate grade change. A grade of *I* automatically becomes a grade of *F* one calendar year after the date of the last class meeting in the semester for which the grade of *I* was assigned.

THE QUALITY-POINT INDEX

Scholarship is computed in terms of the quality-point index, obtained by dividing the number of quality points by the number of semester hours for which the student has registered, both based on his record in this University. Quality points are computed from grades as follows: *A*, four points; *B*, three points; *C*, two points; *D*, one point; *F*, no points, for each semester hour for which the student has registered. Courses in which the grades of *W* or *I* are assigned are not considered in determining the index, except that a course in which the grade of *I* has been assigned will be considered when a formal grade has been recorded. Grades earned at other institutions are not considered in computing the quality-point index.

DEAN'S HONOR LIST

Students who achieve a quality-point index of 3.50 or higher are placed on the Dean's Honor List for that semester. Appearance on the list is limited to full-time students registered for a minimum of 12 semester hours and part-time students registered for a minimum of 12 semester hours over two consecutive semesters, which may include a summer term.

PROBATION

A student who has attempted a minimum of 12 semester hours of course work and whose cumulative quality-point index is below 2.00 is placed on probation

for the period in which he or she next attempts 12 additional semester hours of work. A student whose attendance or conduct has been unsatisfactory is placed on disciplinary probation for the period in which he or she next attempts 12 additional semester hours of work.

SUSPENSION

A student whose quality-point index remains below 2.00 after a 12-semester hour period of probation is suspended.

A student suspended for poor scholarship may not register for coursework even as an auditor. The student may apply for readmission after the lapse of either the fall or spring semester following suspension. Evidence must then be presented to the chairman of the department concerned demonstrating a better qualification to pursue college-level course work. A student suspended twice for poor scholarship may not be readmitted after the second suspension.

Withdrawal

Withdrawal from a course or from the University requires the permission of the Associate Dean for Allied Health Programs. Permission to withdraw from the University will not be granted a student who does not have a clear financial record (see "Withdrawals and Refunds," page 51).

All charges for courses dropped without the approval of the Associate Dean for Allied Health Programs must be met by the student. Reporting the dropping of a course to an instructor does not constitute an official withdrawal.

Changes in Program of Study

Changes within the School of Medicine and Health Sciences' Allied Health Programs.—A student may not substitute one course for another, drop courses (see "Withdrawal," above), change status from credit to audit or audit to credit without the approval of the Associate Dean for Allied Health Programs.

Change from one section to another of the same course may be made with the approval of the Associate Dean for Allied Health Programs and the chairman of the department concerned.

Change from one area of concentration to another within the School of Medicine and Health Sciences may be made with the approval of the Associate Dean for Allied Health Programs. All requirements of the course of study to which the change is made must be met.

Transfer within the University.—Application for transfer to another college, school, or division must be made to the Office of Admissions. A maximum of 45 semester hours earned in the Division of University Students may be applied toward a bachelor's degree in the School of Medicine and Health Sciences.

Credit

Credit is given only after registration for a course and satisfactory completion of the required work, or upon the assignment of advanced standing in accordance with the regulations of the several colleges, schools, and divisions.

Auditing.—A person who has been admitted to the University may be regis-

tered, with the permission of the instructor, as an "auditor" in a class (no academic credit). An auditor is not required to take active part or to pass examinations. A student who takes a course as an auditor may not repeat it later for credit.

Post-Admission Transfer Credit

A student who plans to attend another institution and apply credit so earned toward graduation from this University must first secure the written approval of the Associate Dean for Allied Health Programs. In no event will credit in excess of what might be earned in a similar period in this University be recognized.

Balance Sheet

Sometime during the student's first semester the Associate Dean for Allied Health Programs will issue to undergraduate degree candidates a balance sheet showing the amount of work completed and the requirements remaining to be met for the degree. A second balance sheet is issued only if the student changes major or degree objectives.

Transcripts of Record

Official transcripts of student records are issued on request of the student or former student who has a clear financial record. A fee of $2 is charged for each transcript. When more than two transcripts are ordered at the same time, a $2 fee is charged for each of the first two transcripts and a $.50 fee is charged for each additional transcript.

Continuous Registration

Degree candidates are expected to maintain continuous registration until *all* degree requirements are satisfied. Students who have completed course registration must maintain continuous registration by paying the "continuous registration" fee (see page 49). By failing to register for one semester or more, the student breaks registration and must be readmitted (see "Readmission," page 56). A "readmitted student" is subject to the regulations and requirements in force at the time of readmission.

Students must be registered during the summer if they are taking courses or are expecting to be graduated at the end of the Summer Sessions.

Military Leave

A student called to active duty may be granted military leave for the period of active duty, upon presentation to the dean of a copy of the military orders and petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, the student must apply for readmission to the University well in advance of the semester of expected return. Payments for tuition and fees which are not refunded to the student at the time military leave is granted will be maintained as a deferred credit for the student's account and used upon return to the University.

Graduation Requirements

Degrees are conferred in February, May and September.

To be recommended by the Faculty for graduation a student must have met the admission requirements of the college or school in which registered; completed satisfactorily the scholarship, curriculum, residence and other requirements for the degree for which registered; and be free from all indebtedness to the University. Registration, either for coursework or on the "continuous registration" fee basis, is required for the semester or summer session at the close of which the degree is to be conferred.

Application for Graduation.—An "Application for Graduation" form must be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the senior or final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (not formal convocation) dated September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

Scholarship.—The student must meet the scholarship requirements for the particular degree for which registered.

Curriculum.—Minimum curriculum requirements for each degree are stated on pages 57, 60.

Residence.—A minimum of 18 semester hours of course work in the area of concentration for the Associate in Science degree and a minimum of 30 semester hours of course work in the area of concentration for the Bachelor of Science degree must be completed while registered in the School of Medicine and Health Sciences. This requirement applies to students transferring within the University as well as to students transferring from other institutions.

Attendance and Conduct.—The University reserves the right to confer a degree upon a candidate whose attendance or conduct has been unsatisfactory.

With Distinction

In all undergraduate divisions of the University a baccalaureate degree may be conferred "With Distinction," at the discretion of the faculty, if a student meets the specific requirements of the college or school in which enrolled.

Students in the Allied Health Sciences programs must have a quality-point index of 3.50 or higher in all course work taken at this institution. To be eligible a student must have completed at this institution at least one-half of the courses required for the degree.

FINANCIAL AID

The George Washington University has, for full-time undergraduate students, a program of financial assistance consisting of scholarships, loans, grants, part-time employment or any combination of these resources. The University participates in the National Direct Student Loan, Supplemental Educational Opportunity Grant and College Work-Study programs. Financial aid is awarded on the basis of the student's scholastic record, financial need and qualities of lead

ership. Complete information concerning financial assistance is available from the Office of Student Financial Aid, George Washington University, Washington, D.C. 20052.

REQUIREMENTS FOR THE DEGREE OF ASSOCIATE IN SCIENCE

The satisfactory completion of a minimum of 60 semester hours of course work is required for the degree of Associate in Science; however, some departments may set the requirements above the minimum. The course work must be distributed as follows:

1. **Human Competence**

   A minimum of six semester hours in English Composition (Engl 9 or 10, and 11 or 12), plus a minimum of six semester hours of meaningful initiation into the humanities, mathematics or social studies.

2. **Subject Competence**

   The number of semester hours required depends on the student's specific area of concentration. However, students must elect courses related to allied health sciences in biological sciences, mathematics or physical sciences. (Students may not use the same mathematics courses to satisfy both the human competence (see above) and subject competence requirements.)

3. **Vocational Competence**

   A minimum of 30 semester hours in vocational competence skills related to the area of concentration.

4. **Elective**

   The number of elective hours depends on the number of semester hours of specific required courses the student has in the selected program of study; in some programs the student may be allowed to choose electives, but in others the student may be required to elect specific courses.

Students who plan to pursue a bachelor's degree are advised to plan their ssociate's degree program so that they will satisfy the prerequisites to the de- ree of their choice.

cholarship Requirements

n over-all quality-point index of 2.0 is required for coursework leading to he degree of Associate in Science. A quality-point index of 2.50 is required for ourse work in the student's area of concentration. See pages 52–53 for expla- ation of the grading system and the quality-point index.

esidence Requirement

minimum of 18 semester hours of course work in the area of concentration ust be satisfactorily completed in residence in the School of Medicine and ealth Sciences.

Medical Laboratory Technique Program

The program of study leading to the degree of Associate in Science with a co centration in Medical Laboratory Technique is offered only to military student off campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on page 42–44. Mature students who do not meet these requirement *may* be consid ered for degree candidacy after the satisfactory completion of a probationar period of 15 semester hours of course work taken in residence at George Wash ington University with a minimum quality-point index of 2.50. The qualifying course work must include nine semester hours in biological sciences, chemistry or mathematics, and six semester hours in at least two other areas.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 61 semester hours of course work is required:

	Semester Hours
Nonclinical Course Work	
Engl 9 or 10 and 11 or 12 (or equivalent)	6
Math 3 and 6 (or equivalent)	4
Chem 9 or 11 (or equivalent)	3
Chem 10 (or equivalent)	5
	18
Clinical Course Work	
Path 13, 14, 15, 16, 17, 18, 19 and 20	43
Total	61

Medical Services Technology Program

The program of study leading to the degree of Associate in Science with a con centration in Medical Services Technology is currently available only to military personnel at off-campus military installations.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pages 42–44. Mature students who do not meet these requirements *may* be considered for degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of coursework taken in residence at George Washington University with a minimum quality-point index of 2.50.

DEGREE REQUIREMENTS

The satisfactory completion of 62 semester hours of course work is required:

Courses Outside the Area of Concentration	Semester Hours
Engl 9 or 10 and 11 or 12 (or equivalent)	6
Psyc 1 or Soc 1	3
Elective (to be selected in consultation with the adviser)	6
	15
Area of Concentration	
HCS 10, 11, 15, 16, 22, 67, 68, 92, 93, 94, 95, 96	47
Total	62

Nuclear Medicine Technology Program

The program of study leading to the degree of Associate in Science with a concentration in Nuclear Medicine Technology is offered both on and off campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pages 42–44. A personal interview or a letter of recommendation may be required for some students. Mature students who do not meet the standard requirements may be considered for admission to degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of coursework taken in residence at George Washington University with a minimum quality-point index of 2.50.

DEGREE REQUIREMENTS

The satisfactory completion of 60 semester hours of course work is required:

Courses Outside the Area of Concentration	Semester Hours
Engl 9 or 10 and 11 or 12 (or equivalent)	6
Social Sciences (as determined by the faculty adviser; Psyc 1 recommended)	3
Humanities (selected from art, music, philosophy or religion)	3
	12
Area of Concentration	
Rad 43, 44, 55, 56, 57, 58, 59, 65, 66, 72, 75, 81, 82, 93, 94, 98	48
Total	60

Radiologic Technology Program

The program of study leading to the degree of Associate in Science with a co centration in Radiologic Technology is offered only to military students campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pag 42–44. A personal interview or a letter of recommendation may be required some students. Mature students who do not meet the standard requiremen may be considered for admission to degree candidacy after the satisfactor completion of a probationary period of 15 semester hours of coursework tak in residence at George Washington University with a minimum quality-poi index of 2.5.

DEGREE REQUIREMENTS

The satisfactory completion of 61 semester hours of course work is required:

Courses Outside the Area of Concentration	Semester Hours
Engl 9 or 10 and 11 or 12 (or equivalent)	6
Social Sciences (as determined by the faculty adviser)	3
Humanities (as determined by the faculty adviser)	3
	12
Area of Concentration	
Rad 40, 41, 42, 50, 51, 60, 61, 62, 70, 71, 80, 90, 95, 96, 97, 99	49
Total	61

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

The satisfactory completion of a minimum of 120 semester hours of coursework is required for Bachelor of Science programs; however, some departments may set the requirements above the minimum. The coursework must be distributed as follows:

1. **Human Competence**

   A minimum of six semester hours in English Composition (Engl 9 or 10 and 11 or 12) plus 24 semester hours in meaningful initiation into any two of the three general areas of the humanities, mathematics or social studies.

2. **Subject Competence**

   A minimum of 30 semester hours of didactic information related to the allied health sciences. This requirement may include the biological sciences, mathematics or the physical sciences.

3. **Vocational Competence**
A minimum of 60 semester hours in vocational competence skills related to the area of concentration.

cholarship Requirements

n over-all quality-point index of 2.0 is required for coursework in programs eading to the Bachelor of Science degree. A quality-point index of 2.50 is equired for course work in the student's area of concentration. See pages 52–53 for explanation of the grading system and the quality-point index.

esidence Requirement

A minimum of 30 semester hours of coursework in the area of concentration must be satisfactorily completed in residence in the School of Medicine and Health Sciences.

edical Technology Program

he satisfactory completion of 120 semester hours of course work is required r the degree of Bachelor of Science in the field of Medical Technology.

ESIDENCE REQUIREMENT

minimum of 60 semester hours must be spent in residence for the degree of achelor of Science in the field of Medical Technology, including the 12-month edical Technology program at the University Hospital in the fourth year Path 121, 122, 123, 124, 125, 126, 127, 128).

URRICULUM

First Two Years

		Semester Hours
Engl:	Engl 9 or 10 and 11 or 12	6
Humanities:	Six semester hours selected from one of the following combinations: Art 31–32; Art 71–72; Engl 51–52; Engl 71–72; Engl 191–92; Mus 3 and 4; Rel 9 and 10; or Rel 59–60	6
Math:	Math 3, 6	6
	NOTE: the Math 3 requirement may be satisfied by offering two years of high school algebra acceptable for admission; the Math 6 requirement may be satisfied by offering one-half year of high school trigonometry acceptable for admission.	
Science:	BiSc 11–12, 111	12
	Chem 11–12, 22	12
cial Studies:	Six semester hours selected from one of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and	

	52; Hist 39–40; Hist 71–72; PSc 4 and 6; PSc 5 and 6; or Soc 1 and 2	
Elective:	Courses other than science	

2. Junior Year

Chem 50:	Introduction to Organic Chemistry	
BiSc:	Four semester hours selected from the following	
BiSc 104:	Comparative Vertebrate Anatomy	
BiSc 127:	Genetics	
and BiSc 128:	Genetics Laboratory	
BiSc 148:	Histology	
BiSc 154:	Vertebrate Zoology	
BiSc 163:	Human Physiology	
and BiSc 164:	Human Physiology Laboratory	
Electives:	Nonscience courses	

3. Senior Year

Path 121:	Introduction to Medical Technology	
Path 122:	Clinical Chemistry Lecture	
Path 123:	Clinical Microbiology Lecture	
Path 124:	Blood Bank Lecture	
Path 125:	Clinical Hematology Lecture	
Path 126:	Selected Topics in Laboratory Medicine	
Path 127:	Clinical Laboratory Rotation	
Path 128:	Clinical Laboratory Rotation	

Total

The fourth-year courses constitute the major. Each candidate must make application to take the 12-month Medical Technology program at the University Hospital; this should be done early in the third year. Although admission to the degree program does not assure acceptance into the Medical Technology program at the Hospital, George Washington University students are given preference. A number of scholarships are provided by the University Hospital for students in the fourth year of the degree program.

Physician's Assistant Program

The program leading to the degree of Bachelor of Science with designation as Physician's Assistant requires the satisfactory completion of 120 semester hours of coursework.

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on page

42-44. In addition, three letters of recommendation, a personal interview and one year (2,000 hours) of patient-care experience are required. (Under special circumstances exceptions may be made by the Committee on Admissions.)

SCHOLARSHIP REQUIREMENTS

Scholarship requirements are stated on page 61. Candidates for the degree of Bachelor of Science with a designation as Physician's Assistant must maintain an overall quality-point index of 2.0 for coursework taken in the Physician's Assistant program. A quality-point index of 2.50 is required for those courses in the core curriculum (area of concentration). Each student must complete and pass all courses for which registered in any given semester before being allowed to advance to the next semester.

RESIDENCE REQUIREMENT

A minimum of 75 semester hours in the preclinical and clinical portion of the Bachelor of Science degree curriculum must be completed in residence at the School of Medicine and Health Sciences.

DEGREE REQUIREMENTS

All students must complete the 30-semester-hour requirement in the area of human competence (see page 60). The subject and vocational area requirements are satisfied by the completion of a 90-semester-hour sequence of required and elective courses, distributed as follows:

	Semester Hours
1. Basic Health Sciences (18 weeks)	
HCS 110: Structure of the Human Body	3
HCS 111: Function of the Human Body	3
HCS 112: Molecular Basis of Matter and the Human Body	3
HCS 109: Human Behavior I	2
HCS 113: Medicine and Society	1
HCS 116: Medical Terminology	1
HCS 119: Introduction to Patient Care I	1
Total	14
2. Clinical Health Sciences (26 weeks)	
*HCS 125: Manifestation of Disease	8
*HCS 131: Human Behavior II	2
HCS 134: Introduction to Patient Care II	3
HCS 140: Clinical-Pathological Correlation	0
HCS 146: Surgical and Diagnostic Procedures	3
HCS 147: Introduction to Radiology	2
HCS 148: Introduction to Electrocardiography	2
HCS 150: History-taking Review and Theory	1
HCS 151: Clinical Pharmacology	2

*Area of concentration courses. See "Scholarship Requirements," above.

HCS 152: Introduction to Basic Laboratory Medicine .....
Micr 128: Microbiology for New Health Practitioners .....
Path 129: Pathology for New Health Practitioners .....
Phar 158: Pharmacology for New Health Practitioners .....

Total .....

3. **Clinical Clerkship** (54 weeks)

*HCS 160: Medical Inpatient .....
*HCS 163: Medical Outpatient .....
HCS 166: Surgical Inpatient .....
HCS 169: Obstetrics and Gynecology .....
*HCS 172: Pediatric Outpatient .....
*HCS 175: Primary Care Preceptorship .....
HCS 178: Emergency Medicine .....
HCS 198: Psychiatry .....
HCS 199: Independent Study .....

Total .....

CERTIFICATE

A certificate is awarded upon completion of the 90-semester-hour sequence of required and elective courses in Health Care Sciences.

Nurse Anesthetist Program

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 42–44. Candidates for the degree of Bachelor of Science with designation as Nurse Anesthetist must also fulfill the following requirements:

1. They must have graduated from a National League of Nursing accredited school of nursing.
2. They must be licensed as a registered professional nurse in at least one state or the District of Columbia.
3. They must satisfy the requirements of a school of anesthesia at an affiliated hospital.

ADVANCED STANDING

General provisions for advanced standing are stated on pages 44–46. In addition, students in the Nurse Anesthetist bachelor's degree program may be granted advanced standing for the following:

1. Students who hold a bachelor's degree in nursing may receive up to [illegible] semester hours' credit: (a) 30 hours' credit for vocational skills and/or completion of the National League of Nursing examination in medical-surgical nursing; and (b) 30 hours' credit in subjects relating to human

* Area of concentration courses. See "Scholarship Requirements," page 63.

competence, which must include a minimum of six semester hours in English and meaningful initiation into two areas selected from among language, social studies, humanities and general mathematics.

2. Students who are graduates of nursing schools which award some type of diploma other than a bachelor's degree may receive 30 semester hours' credit for nursing school (vocational) skills on completion of the National League of Nursing examination on medical-surgical nursing (Parts I and II). These students may also receive credit on an individual basis for coursework in the area of human competence which they have earned at an accredited college or university.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is required for the degree of Bachelor of Science with designation as Nurse Anesthetist. However, since all students enter the program with a minimum of 30 semester hours of advanced standing (see Nos. 1(a) and 2 above), the number of hours actually completed at this University will be 90 or less. Thirty semester hours in the area of vocational competence are required, consisting of the following courses: Anat 115; Anes 190, 191, 192, 193; Phar 21–22, 110, 120; Phyl 115. In addition, students must complete a minimum of 9 semester hours in clinical anesthesiology (Anes 194).

CERTIFICATE

Students who do not wish to apply for degree candidacy may qualify for a Certificate in Nurse Anesthesia by satisfactorily completing a 21-semester-hour program consisting of the following courses: Anat 115; Anes 192, 193; Phar 21-22, 110; Phyl 115.

Nurse Practitioner Program

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 42–44. Candidates for the degree of Bachelor of Science with designation as Nurse Practitioner must also fulfill the following requirements:

1. They must have been graduated from a school of nursing with an over-all quality-point index of at least 2.00 or the equivalent.
2. They must be licensed as registered nurses in at least one state or the District of Columbia.
3. They must have had a minimum of three years' experience in nursing practice in hospital and ambulatory settings.
4. They must have three letters of recommendation forwarded from employers, supervisors in the health field, and/or acquaintances.

Preference will be given to applicants who have made arrangements with a physician or an institution to be employed as a nurse practitioner.

SCHOLARSHIP

The grades of *CR* (Credit) and *NC* (No Credit) are given. A student who h received a grade of *NC* in any of the preclinical courses will be ineligible t continue in the clinical portion of the program until the course has been re peated and a grade of *CR* has been received. Progress through each portion o the clinical phase will be evaluated by the faculty in charge of that particula rotation.

ADVANCED STANDING

General provisions for advanced standing are listed on pages 44–46. In addi tion, students may receive up to 30 semester hours of advanced standing for successful completion of nursing school. No advanced standing will be granted in the required 44-semester-hour area of concentration.

RESIDENCE REQUIREMENT

A minimum of 44 semester hours of coursework in the area of concentration must be completed in residence in the School of Medicine and Health Sciences.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is required for the degree of Bachelor of Science with designation as Nurse Practitioner, distributed as follows:

1. 30 semester hours of coursework in the area of Human Competence, in cluding Engl 9 or 10, and 11 or 12, and 6 semester hours of meaningful initiation into two of these areas—social studies, humanities, and mathematics.
2. 30 semester hours of course work in the area of subject competence, in cluding 21 hours in the physical or natural sciences and 3 hours in the mathematical sciences, the latter in addition to any mathematics course taken to satisfy the vocational competence requirement.
3. 60 semester hours in the area of vocational competence, including the 44-semester-hour area of concentration, consisting of the following courses: HCS 109, 119, 125, 134, 137, 140, 142, 143, 144, 153, 157, 165, 179; Micr 128; Path 129; Phar 158.

VOCATIONAL COMPETENCE CURRICULUM

1. **Clinical Health Sciences** 2
   - HCS 109: Human Behavior 1
   - HCS 119: Introduction to Patient Care I 6
   - HCS 125: Manifestation of Disease 5
   - HCS 134: Introduction to Patient Care II 1
   - HCS 137: Dynamics of the Life Cycle .....

HCS 140: Clinical Pathological Correlation	0
HCS 142: Nurse Practitioner Seminar I	2
HCS 143: Nurse Practitioner Seminar II	3
HCS 144: Nurse Practitioner Seminar III	1
Micr 128: Microbiology for New Health Practitioners	2
Path 129: Pathology for New Health Practitioners	2
Phar 158: Pharmacology for New Health Practitioners	2

2. **Clinical Rotations**

HCS 153: Gynecology Outpatient: Nurse Practitioner	3
HCS 157: Primary Care Preceptorship: Nurse Practitioner	6
HCS 165: Medical Outpatient: Nurse Practitioner (minimum hours required)	6
HCS 179: Emergency Medicine: Nurse Practitioner	2
Total	44

CERTIFICATE

Nurse Practitioner certification will be granted to those students who meet the requirements for admission to the degree program and who complete the 44-semester hour area of concentration without completing the remainder of the requirements for the Bachelor of Science degree.

Radiologic Sciences and Administration Program

The program leading to the degree of Bachelor of Science in the field of Radiologic Sciences and Administration requires the satisfactory completion of a minimum of 120 semester hours of coursework. This program is designed for registered technologists in either diagnostic radiologic technology, nuclear medicine technology or radiation therapy technology who wish to continue their education at the bacculaureate level.

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 42–44. In addition, students applying to the program must be registered technologists or registry-eligible within the first academic semester. A personal interview or a letter from the principal or dean of the school previously attended is required.

ADVANCED STANDING

General provisions for advanced standing are stated on pages 44–46. Students who (1) have completed study within the last five years, with a quality-point index of at least 2.50 or a grade average of at least 80 per cent, at a radiologic technology, nuclear medicine technology or radiation therapy technology school that is accredited by Joint Review Committee on Education Programs in Radiologic Technology or Nuclear Medicine of the Council on Medical Education of the American Medical Association, and who (2) are certified as American

Registered Radiologic Technologists, Nuclear Medicine Technologists or Ra tion Therapy Technologists may be granted up to 48 semester hours of vanced standing credit.

SCHOLARSHIP

Scholarship requirements are stated on page 61.

DEGREE REQUIREMENTS

Area of Human Competence

A minimum of 30 semester hours is required, including BAd 102, 105; Engl or 10 and 11 or 12; Psyc 1; Soc 1. Recommended electives include Engl 10 Hum 26; Psyc 151; Soc 129; SPDR 111, 121; or other courses in the humar ties or social sciences.

Area of Subject and Vocational Competence

A total of 93 semester hours is required. Of these a maximum of 48 semes hours is allowed for coursework in an American Medical Association approv program in either diagnostic radiologic technology, nuclear medicine technolo or radiation therapy technology. The remaining 45 semester hours consist o the following required courses:

1. **Radiologic Sciences**

CIEng 101:	Practical Computing for Paramedics
Rad 167:	Radiation Physics and Safety I
Rad 171:	Radiological Electronics and Engineering
Rad 175:	Physics of Radiological Imaging,
Rad 176:	Physics of Nuclear Medicine
or Rad 177:	Dosimetry in Radiation Therapy
Rad 190:	Radiobiology
Rad 195:	Directed Study in Radiation Physics

2. **Radiologic Administration**

HCA 142:	Financial Management in Health Care Institutions
HCA 153:	Survey of Health Care Organization
HCA 154:	Introduction to Hospital Management and Procedures
HCA 170:	Quantitative Methods in Health Care Administration
Psyc 144:	Personnel and Industrial Psychology
Rad 140:	Radiology Administration
Rad 145, 147 or 149:	Administrative Project
Rad 150:	Radiology Senior Study
Soc 124:	Medical Sociology

Total

Required or Recommended Courses in Allied Health Programs Offered in Other Divisions of the University

THE FOLLOWING COURSES are offered by Columbian College of Arts and Sciences or the School of Government and Business Administration, and are either required or recommended in specific undergraduate programs in the School of Medicine and Health Sciences. Students are reminded, however, that not all these courses are acceptable even as electives in certain Allied Health Programs. Students should consult with the program adviser in choosing electives for the particular program in which they are enrolled.

ACCOUNTING

1 Introductory Accounting (3)

Basic understanding of accounting concepts, procedures, analyses and reports; the accounting measurement and communications of significant economic and financial data.

AMERICAN CIVILIZATION

71–72 Introduction to American Civilization (3–3)

Themes and issues in American civilization since colonial times, with emphasis on their contemporary importance.

ANTHROPOLOGY

1–2 Introductory Anthropology (3–3)

Anth 1: survey of man's origin, physical evolution and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior.

ART

31–32 Survey of Western Art (3–3)

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art. Art 31: prehistoric to Gothic art. Art 32: proto-Renaissance to contemporary art.

71–72 Introduction to the Arts in America (3–3)

Painting, sculpture, and architecture of America, with selected references to crafts and popular arts. Art 71: from colonial beginnings to the Republican Age. Art 72: from 19th century to the present.

BIOLOGICAL SCIENCES

11–12 Introductory Biology for Science Majors (4–4)

Lecture (3 hours), laboratory (3 hours). Biological principles and p
lems designed to furnish a base for advanced studies in biology and
lated sciences. Prerequisite to BiSc 12: BiSc 11. Material fee, $1
semester.

104 Comparative Vertebrate Anatomy (4)

Lecture (2 hours), laboratory (4 hours). Evolution and comparat
morphology of chordata, stressing recent forms. Material fee, $20.

111 Introductory Microbiology (4)

Lecture (2 hours), laboratory (4 hours). Survey of the major groups
microorganisms with emphasis on structure, physiology, ecology, phy
genetic relationships, and economic importance. Prerequisite: one ye
of chemistry. Material fee, $20.

127 Genetics (3)

Introductory course. Basic aspects of transmission of genetic traits w
particular reference to the chemical basis of heredity and gene action.

128 Genetics Laboratory (1)

Study of genetic principles using Drosophila, *E. coli*, and lambda phag
Prerequisite or concurrent registration: BiSc 127. Material fee, $20.

148 Histology (4)

Lecture (2 hours), laboratory (4 hours). Introduction to microscopic
anatomy of normal tissues and organs with emphasis on the interre
tionship of structure and function. Material fee, $20.

154 Vertebrate Zoology (4)

Lecture and discussion (2 hours), laboratory and field (4 hours). Ver
brate natural history and systematics, emphasizing higher and transition
taxa. Prerequisite: BiSc 104. Material fee, $20.

163 Human Physiology (3)

Introduction to the function of organ systems of the human body.

164 Human Physiology Laboratory (1)

Study of basic physiology laboratory techniques; emphasis on the exp
mental study of homeostatic mechanisms in humans. Prerequisite
concurrent registration: BiSc 163. Material fee, $24.

165 Vertebrate Physiology (4)

Lecture (3 hours), laboratory (3 hours). Detailed study of selected org
systems, stressing chemical and physical bases. Prerequisite: BiSc 1
and 164, or equivalent. Prerequisite or concurrent registration: Ch
151–52 or 50. Material fee, $24.

BUSINESS ADMINISTRATION

102 Fundamentals of Management (3)

Planning, organizing, directing, coordinating and controlling activities
the administrative unit; evolution of management thinking.

105 **Personnel Management** (3)

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities.

CHEMISTRY

9 **General Chemistry** (4)

Offered only off-campus. Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, inquantitative analysis. Prerequisite: one year of high school algebra. Laboratory fee, $23.

11–12 **General Chemistry** (4–4)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $28 a semester.

22 **Introductory Quantitative Analysis** (4)

Lecture (2 hours), laboratory (6 hours). Theory and practice of quantitative analysis by classical methods; introduction to instrumental analysis. Prerequisite: Chem 12. Laboratory fee, $28.

50 **Introduction to Organic Chemistry** (4)

Lecture (3 hours), laboratory (3 hours). A terminal course for students in related disciplines. This course does not fulfill the organic chemistry requirement for chemistry majors or premedical students. Prerequisite: Chem 12; or 16, *Intensive General and Analytical Chemistry* (Honors course). Laboratory fee, $28.

ECONOMICS

1–2 **Principles of Economics** (3–3)

Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1: macroeconomics; Econ 2: microeconomics.

ENGLISH

9 **English Composition: Language as Communication** (3)

Intensive course in English grammar and composition for students inadequately prepared for Engl 10. Begins with detailed instruction, drill and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 10. Engl 9 meets five hours a week and carries 3 semester hours of credit. Fees: tuition, $294; special fee, $25; University Center fee, $15.

10 **English Composition: Language as Communication** (3)

Study and practice of expository techniques: emphasis on the rhetorical complexities of unity, development, organization and coherence, by analysis of selected current prose; library research procedure.

11 English Composition: Language and the Arts and Sciences (3)

Study and practice of expository and argumentative techniques; empha on the rhetorical complexities of the sentence and of diction, and on lo ical thought, by analysis of selected readings on the nature of langua and of the arts and sciences. Prerequisite: Engl 9 or 10. Students w receive credit for Engl 11 cannot receive credit for Engl 12.

12 English Composition: Language in Literature (3)

Study and practice of expository and argumentative techniques throu critical writing; emphasis on the rhetorical complexities of stylistics in t sentence and in diction, and on logical thought, by the study of literar genres and of the use of language in literature. Prerequisite: Engl 9 o 10. Students who receive credit for Engl 12 cannot receive credit fo Engl 11.

20 The Writing of Reports (3)

Offered only off campus. Theory and practice in the writing of technica reports. Prerequisite: Engl 9 or 10 and 11.

43–44 Classical Humanities (3–3)

Offered only off campus. Interdisciplinary study of the origins of Wes ern thought. Reading and intensive class discussions of selections from the Bible and from five works each semester from the following authors Homer, Hesiod, Aristophanes, Plato, Aristotle, Aeschylus, Euripides Sophocles, Herodotus, Thucydides, Lucretius, Marcus Aurelius, Epictetus Polybius, St. Augustine. Background lectures on the major intellectua artistic, economic and social movements. Prerequisite: Engl 9 or 10.

45–46 Humanities in the Modern World (3–3)

Offered only off campus. Interdisciplinary study of modern Western thought from the Renaissance to the 20th century. Reading and intensive class discussion of five works each semester from the following authors: Machiavelli, Pope, Voltaire, Rousseau, Goethe, Tolstoy, J.S. Mill Zola, Nietzsche, Kierkegaard, Freud, Kafka, Koestler, T.S. Eliot. Back ground lectures on the major intellectual, artistic, economic and soci movements. Prerequisite: Engl 9 or 10.

51–52 Introduction to English Literature (3–3)

Representative works by major authors studied in their historical contex discussion of recurrent themes, and introduction to various types and forms of imaginative literature. Prerequisite: Engl 9 or 10.

71–72 Introduction to American Literature (3–3)

Historical survey. Engl 71: from beginnings to the Civil War. Engl 72 from the Civil War to present. Prerequisite: Engl 9 or 10.

101 Expository Writing (3)

Types of expository writing; weekly exercises based on students' needs particular attention may be given to problems in the writing of gradu ate theses. Prerequisite: Engl 9 or 10; 11 or 12.

191–92 Introduction to European Literature (3–3)

(Formerly Engl 91–92)

Selected major works in various genres, read in translation and in en tirety. Engl 191: *Iliad* and *Aeneid;* dramas from ancient to modern times Engl 192: Plato, Ovid and Dante; medieval saga and romance; prose fic tion from Cervantes to Mann. Prerequisite: Engl 9 or 10.

EXPERIMENTAL HUMANITIES

*26 **Environmental Issues** (3)

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy.

GEOGRAPHY AND REGIONAL SCIENCE

51 **Introduction to Geography** (3)

General survey of the systematic fields of human geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts.

52 **Introduction to Economic Geography** (3)

Examination of the basic principles which determine the location of economic activities on the surface of the earth.

HEALTH CARE ADMINISTRATION

†142 **Financial Management in Health Care Institutions** (3)

Consideration of the nature, analysis, and interpretation of accounting data. Cost accounting, budgeting, and internal control techniques, emphasis on their use in the management planning and control process.

153 **Survey of Health Care Organization** (3)

Introduction to the organization and delivery of health care services in the United States. Emphasis on the structural features of and the resources available to the health care system.

154 **Introduction to Hospital Management and Procedures** (3)

Introduction to the structure and management of contemporary American hospitals; emphasis on the organization of hospital departments and on the functions of the department manager.

†170 **Quantitative Methods in Health Care Administration** (3)

Introduction to the application of quantitative methods to the health services industry. Fundamental statistical techniques enabling the student to read, comprehend, critically appraise, and intelligently utilize the growing volume of quantitative research appearing in the health services literature. Familiarization with quantitative procedures applied to analyzing management problems in the operational environment. Emphasis on establishing a fundamental understanding of statistical "ideas" rather than upon manipulating predeveloped formulas.

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* Offered jointly by the Division of Experimental Programs and the departments of biological sciences and geography and regional science.

† Generally offered only off-campus for students enrolled in the Bachelor of Science in Health Care Administration degree program at the Naval School of Hospital Administration. Offered on campus when justified by sufficient enrollment.

HISTORY

39–40 European Civilization in Its World Context (3–3)

Hist 39: political, social, economic, and cultural history to early mo era. Hist 40: from early modern era to present.

71–72 Introduction to American History (3–3)

Hist 71: political, social, economic, and cultural forces of the Un States in their world setting from the beginning to 1876. Hist 72: f 1876 to present.

MATHEMATICS

3 College Algebra (3)

Equivalent to the standard two years of high school algebra with seve additional topics. Prerequisite: one year each of high school algebra a high school geometry.

6 Plane Trigonometry (3)

Prerequisite: two years of high school algebra and one year of high sch geometry, or Math 3 (or concurrent registration therefor).

9 General Mathematics I (3)

For students electing Math 9 and 10 as a terminal sequence. Logic, se number systems. Prerequisite: two years of high school mathematics.

10 General Mathematics II (3)

Mathematical systems, geometry and introduction to statistics and pro ability. Prerequisite: Math 9.

30 Precalculus (3)

Set theory, inequalities, basic analytic geometry, functions and relation Polynomial, trigonometric, logarithmic and exponential functions. Pre requisite: Math 3 and 6; or one and one-half years of high school alg bra, one year of high school geometry, and one-half year of high scho trigonometry; or equivalent. Prior to registration, new students must tak a placement examination in algebra and trigonometry.

31 Calculus of One Variable (3)

Differentiation and integration of algebraic and elementary transcendent functions, with simple applications. Prerequisite: Math 30 or equivalent.*

51 Mathematics for the Social and Management Sciences I (3)

Notion of function, graph of function; sequences; differential calculus o functions of one variable; exponential and logarithmic functions. No students must take a placement examination in algebra prior to registration

52 Mathematics for the Social and Management Sciences II (3)

Integral calculus of functions of one variable; functions of several vari ables; partial derivatives, maxima and minima, Lagrange multipliers; sy tems of linear equations and inequalities; matrix algebra, determinants rudiments of linear programming. Prerequisite: Math 51.

* Math 30 may be waived as a prerequisite by examination on scheduled dates.

MUSIC

3 Introduction to Musical Understanding (3)
Introductory history of musical styles, related to listening; elements and materials of music.

4 Survey of Music Literature (3)
Introductory study of musical forms, structures, and textures; aural analysis of selected literature.

PHILOSOPHY

50 Introduction to Philosophy (3)
Readings from major philosophers and study of philosophic positions from Plato to the present.

POLITICAL SCIENCE

4 Introduction to Political Science (3)
Study of political behavior, including the role of politics in today's world, the sources of elite and mass political behavior, and the influence and nature of political institutions. Students who receive credit for PSc 4 cannot receive credit for PSc 5.

5 Introduction to Political Science (3)
Introduction to the study of comparative political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies. Students who receive credit for PSc 5 cannot receive credit for PSc 4.

6 Introduction to Political Science (3)
Introduction to the study of the structure, powers and processes of the American political system.

PSYCHOLOGY

1 General Psychology (3)
Fundamental principles underlying human behavior.

8 Psychology of Motivation and Personality (3)
Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized. Prerequisite: Psyc 1 or equivalent.

22 Introduction to Educational Psychology (3)
The contributions of psychology to education; emphasis on learning. Prerequisite: Psyc 1 or equivalent.

144 Personnel and Industrial Psychology (3)
Psychological concepts and methods applied to problems of personnel

management, human engineering, employee motivation and productivi
Prerequisite: six semester hours in psychology.

151 Social Psychology (3)

Social foundations of attitudes and behavior: cognition, motivation, rol behavior, communication, small-group processes, racial attitudes, nationa ism and war. Prerequisite: six semester hours in psychology.

RELIGION

9 The Hebrew Scriptures (3)

Historical and literary study of the Hebrew Scriptures with consideration of development of religious ideas, institutions and outstanding personali ties.

10 The New Testament (3)

Study of New Testament literature from the standpoint of occasion, pur pose, dominant ideas and permanent values. Emphasis on approach, struc ture and significance of the Gospels and Epistles.

59–60 History of Religions (3–3)

Origins, evolution, and contemporary status in historical context. Rel 59 primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam).

SOCIOLOGY

1 Introductory Sociology (3)

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior.

2 Modern Social Issues (3)

(Formerly Uses of Sociology)

Critical examination of selected major social issues confronting American society. Topics change each semester. May be repeated once for credit. Prerequisite: Soc 1.

124 Medical Sociology (3)

Social factors and processes related to the etiology and treatment of physical and mental illnesss; medical occupations and professions, medical organizations, problems of delivery of health care services. Prerequisite: Soc 1.

129 Race and Minority Groups (3)

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice. Prerequisite: Soc 1.

SPEECH AND DRAMA

111 Business and Professional Speaking (3)

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors.

121 Group Discussion and Conference Leadership (3)

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: SPDR 1, *Communicative Speaking and Listening*, or permission of instructor.

STATISTICS

***51 Introduction to Business and Economic Statistics (3)**

Lecture (3 hours), laboratory (1 hour). Frequency distribution, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18.

***91 Principles of Statistical Methods (3)**

Lecture (3 hours), laboratory (1 hour). Variables and attributes, averages and dispersion, frequency distributions and their characteristics, regression and correlation, statistical decision processes. Laboratory fee, $18.

101–2 Basic Principles of Statistical Methods (3–3)

Offered only off campus. Variables and attributes, averages and dispersion, elementary principles of sampling, introduction to the making of statistical decisions. Prerequisite to Stat 102: Stat 101.

* Stat 51, 53, *Introduction to Statistics in Social Sciences:* and 91 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree.

COURSES OF INSTRUCTION

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES serves other divisions of th University by making available to nonmedical students certain undergraduat and graduate courses in the following departments: anatomy, biochemistry microbiology, pathology, pharmacology and physiology. The courses listed ar subject to change. The University reserves the right to withdraw any cours announced.

STAFF OF INSTRUCTION

The Staff of Instruction listed under each Department is for the academic year 1975–76.

EXPLANATION OF COURSE NUMBERS AND SYMBOLS

A number in parentheses after the name of the course indicates number of semester hours of credit which may be earned. Courses which are only for M.D. degree candidates have no semester hours of credit listed after them.

Courses numbered from 1 to 100 are for first- and second-year undergraduate allied health students. Courses numbered from 101 to 200 are for third- and fourth-year undergraduate allied health students. Courses in the basic science departments numbered from 201 to 400 are for candidates for the M.D degree and for students in the Graduate School of Arts and Sciences. All other courses numbered from 201 to 400 are primarily for candidates for the M.D degree.

KEY TO ABBREVIATIONS

The following abbreviations are used by the University for course designations.

Acct	Accounting	**Anth**	Anthropology
AmCv	American Civilization	**ApSc**	Applied Science
Anat	Anatomy	**Art**	Art
Anes	Anesthesiology	**ArTh**	Art Therapy

Bioc	Biochemistry
BiSc	Biological Sciences
BAd	Business Administration
Cart	Cartography
Chem	Chemistry
Chin	Chinese
CE	Civil Engineering
CH&D	Child Health and Development
Clas	Classics
ClEn	Clinical Engineering
CSci	Computer Science
Derm	Dermatology
Econ	Economics
Educ	Education
EPol	Education Policy
EE	Electrical Engineering
EAd	Engineering Administration
EFL	English as a Foreign Language
EngS	Engineering Science
Engl	English
EnHe	Environmental Health
Envr	Environmental Studies
Hum	Experimental Humanities
ForS	Forensic Sciences
Fren	French
Gnet	Genetics
Geod	Geodesy
Geog	Geography and Regional Science
Geol	Geology
Geop	Geophysics
Germ	Germanic Languages and Literatures
HCA	Health Care Administration
HCS	Health Care Sciences
Hist	History
HKLS	Human Kinetics and Leisure Studies
Idis	Interdisciplinary Courses
Ital	Italian
Japn	Japanese
Jour	Journalism
LAm	Latin American Studies
Law	Law
LEnf	Law Enforcement
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineering
M&PA	Medical and Public Affairs
Med	Medicine
Micr	Microbiology
Mus	Music
NSur	Neurological Surgery
Neur	Neurology
Ob&G	Obstetrics and Gynecology
Ocea	Oceanography
OR	Operations Research
Opth	Ophthalmology
Orth	Orthopaedic Surgery
Otol	Otolaryngology
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
Phys	Physics
Phyl	Physiology
PSc	Political Science
Port	Portuguese
Pchi	Psychiatry and Behavioral Sciences
Psyc	Psychology
PAd	Public Administration
Rad	Radiology
Rel	Religion
SHum	Service-Learning Experimental Humanities
SPSc	Service-Learning Political Science
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
SpEd	Special Education
SPDR	Speech and Drama
Stat	Statistics
Surg	Surgery
TCom	Telecommunication Operations
U&RP	Urban and Regional Planning
Urol	Urology
WStu	Women's Studies

Anatomy

Chairman: R.S. Snell

Professors F.D. Allan, T.N. Johnson, R.S. Snell
Professorial Lecturers J.L. Angel, T.S. Reese

Associate Professors E.N. Albert, M.J. Koering

Associate Clinical Professor G.P. Bogumill

Associate Professorial Lecturers J.A. Di Paolo, E.J. Blanchette-Mackie, K Weston

Assistant Professors M.D. Olson, J.M. Kerns, D.B. Jenkins, D.A. Neufeld

Assistant Professorial Lecturer D.A. Davis

Special Lecturer M.F.K. Ericksen

115 **Anatomy for Anesthetists** (3) St

For students in the Nurse Anesthetist Program. Offered off camp through the College of General Studies. Anatomical facts and concep essential for safe administration of anesthetics; emphasis on anatomy head and neck.

*201 **Anatomy** St

All anatomical disciplines are integrated: regional gross dissection, histo ogy, embryology. (Fall)

202 **Gross Anatomy** (6) Snell and Staf

For graduate students. Regional dissections of adult cadaver supple mented with lectures and X-rays. Laboratory fee, $30. (Fall)

203 **Human Embryology** (1) Allan

For graduate students. Origin and development of human body; emphasi on value of embryology in interpreting anatomical anomalies. (Fall

204 **Neuroanatomy** (2) Johnson, Kerns

For graduate students. Gross and microscopic anatomy of central nerv ous system and special senses. Students who have received credit for Anat 204 may not register for Anat 212. Laboratory fee, $13. (Fall

205 **Human Microscopic Anatomy** (3) Albert and Staff

For graduate students. Microscopic structure of cells, tissues, and organs of the human body. Laboratory fee, $20. (Fall)

206 **Scanning Electron Microscopy** (3) Albert, Morse, Olson

(Formerly Electron Microscopic Histochemistry)

Theory and operation of the scanning electron microscope along with the techniques involved in preparation of tissues and interpretation of micrographs. Laboratory fee, $30.

208 **Comparative Vertebrate Neurology** (1) Johnson

For graduate students. Survey of the evolution of the vertebrate brain. Prerequisite: Anat 204. Laboratory fee, $10. (Spring)

209 **The Use of Audio-visual Techniques in Anatomy** (2) Allan

For graduate students. Preparation of a significant audio-visual program of some aspect of human anatomy. Laboratory fee, $20. (Spring)

210 **The Use of Computers in Anatomy** (2) Snell

For graduate students. Applying computer techniques to the problems of learning anatomy. Limited enrollment. Laboratory fee, $20. (Spring)

* Required for medical students.



Student studies a human skull in the Medical Center's anatomy museum.

211 Cell Biology (2)

For graduate students. Same as Idis 211 and Phyl 211. An integ survey of the structure, function, and metabolism of the cell, as an i duction to the medical sciences.

212 Neurobiology (3)

For graduate students. Same as Idis 212 and Phyl 212. An integ survey of the structure and function of the human nervous sys lecture, clinical demonstration, and laboratory. Laboratory fee, $25.

221–22 Seminar (1–1) O

For graduate students. Research reports and discussions of special to by guest lecturers, staff and graduate students. Medical students enc aged to attend. (Academic year)

249 Introduction to Anatomical Research (1)

For graduate students. Major research techniques as applied to biolog materials in the various anatomical disciplines. (Fall)

252 Physical Anthropology (1) An

Variations in man and factors affecting him, human evolution and ra differences, anatomy and culture of ancient man. (Spring)

254 Fetal Anatomy (2) Al

Dissection of the midgestational human fetus. Comparison of fetal a adult structures. 20 students. Laboratory fee for nonmedical studen $10. (Spring)

256 Human Genetics (1) C.B. Jacob

General principles of genetics, new cytogenetics techniques, aneuploidy man and its significance, biochemical aspects of heredity, genetic couns ing. (Spring)

260 Electron Microscopy in Cellular Biology—Lecture (1) Koen

Introduction to the morphology of the cell and its components. (Spring)

261 Electron Microscopy in Cellular Biology—Laboratory (2) Koen

Introduction to the routine processing of specimens; preparation an interpretation of micrographs. Limited enrollment. Admission by p mission of instructor. Prerequisite or concurrent registration: Anat 20 Laboratory fee for nonmedical students, $15. (Spring and fall)

262 Gross Anatomy of Upper and Lower Extremities (2) Snell and Sta

Detailed dissection, supplemented by X-ray anatomy; discussions, assigne reading. Limited enrollment. Laboratory fee for nonmedical student $10. (Spring)

263 Applied Anatomy of the Autonomic System Alla

Comprehensive study of the structure and function of the autonom nervous system. 4-week elective periods.

264 Gross Anatomy of Head and Neck (2) Sta

Detailed dissection, supplemented by X-ray anatomy; discussions, assigne reading. Limited enrollment. Laboratory fee for nonmedical student $10. (Spring)

266 **Gross Anatomy of Thorax and Abdomen** (2) — Snell

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

268 **Gross Anatomy of Pelvis, Perineum, and Lower Extremity** (2) — Snell and Staff

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

270 **Dissection of the Human Brain** (1) — Johnson

Dissection of major pathways and nuclei of the brain with consideration of ventricular system; conferences and assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

272 **Autonomic Nervous System** (1) — Allan

Development, microscopic and gross anatomy, function of central and peripheral components of autonomic nervous system. (Spring)

276 **Advanced Studies in Anatomy** (1) — Staff

Lectures and conferences on selected anatomical subspecialties—endocrinology, teratology, growth, etc. May be repeated for credit. (Spring)

279 **Applied Regional Anatomy** — Snell

Regional dissection, guided readings, weekly discussions. 4-week elective periods.

281 **Applied Anatomy of the Newborn** — Allan, Snell

The full-term fetus or neonatal infant examined by dissection or by study of pre-dissected specimens. 4-week elective periods.

282 **Advanced Neuroanatomy** — Johnson

Dissection of the human brain, study of slides of the central nervous system, and an introduction to neurological research. 4-week elective periods.

284 **Applied Surface Anatomy and Radiology** — Snell

Detailed study of anatomical structures which are accessible to examination in the living subject; normal radiology of the body. 4-week elective periods.

285 **Application of Audio-visual Techniques to Anatomy** — Allan

Students identify, develop, and produce an audio-visual program on some aspect of human anatomy. 4-week elective periods.

287 **Human Cytogenetics** — C.B. Jacobson

Chromosomal research on reproductive anomalies, congenital malformations, mutagenic assay. Tissue culture, photomicrography, karyotypic analysis, genetic counseling. 8-week elective periods. Univ. Hosp.

288 **Surface Anatomy and Radiology** (1) — Snell

Lectures and demonstrations on areas of clinical importance.

289 **Application of Computer Techniques to Anatomy** S

A simple anatomical program devised to demonstrate the applicatio computer techniques to problems of learning anatomy. 4-week ele periods.

291 **Special Projects in Anatomy** S

Independent study on any aspect of gross anatomy worked out betw the student and the instructor. 4-week elective periods.

292 **Advanced Reproductive Endocrinology** Koe

Study of structure and function of male and female reproductive orga emphasis on correlating their activities with those of other endocr glands. 4-week elective periods.

295 **Research** (arr.) St

Content differs each time course is offered; may be repeated once f credit. Fee to be arranged. (Fall and spring)

398 **Advanced Reading and Research** (arr.) St

Limited to students preparing for the Doctor of Philosophy general e amination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) St

Limited to Doctor of Philosophy candidates. May be repeated for credi (Fall and spring)

Anesthesiology

Chairman: C.S. Coakley

Professors C.S. Coakley, S. Alpert, B.S. Epstein, P. Mazel, R.J. Van Houten, H Weintraub

Associate Professors W.L. Marsh, P.R. Kaiser, M. Kennedy, G.A. Morales, R.F. Tobey, B.S. Dunbar, J.B. Craft, Jr., A.H. Altstatt, J.E. Zimmerman

Associate Clinical Professor S.N. Albert

Assistant Professors M.J. Shaffer, J.P. Swope, M.T. Karna, M. Shahvarl, M.F. Gonzales, D.S. Lee, V.A. Argumedo, S.R. Deshmukh, M.H. Thein, D.B. Peterson, J.A. Tam, J.M. Klick, R.A. Kravetz, A. Fields, P. Holbrook, E.J. Distelhorst, Jr., B.E. Filner, S.P. Watson

Assistant Clinical Professors W.E. Bageant, C. Albert, P. Lowenthal, M.W. Lichtmann, M.H. Rosenthal, H.W. Manitsas

Courses numbered 190 through 195 are for students in Nurse Anesthetist undergraduate programs.

190 **Seminar: Anesthesiology (4)** Staf

Small discussion groups with the teaching staff of the Department on morbidity and mortality from actual and/or reported cases. Topics related to complications of anesthesia.

191 Respiratory Care (3) — **Staff**

Advanced techniques for the care of patients requiring total prolonged respiratory support.

192 Orientation for Anesthesia (3) — **Staff**

Lecture, group discussion, and audio-visual presentation. Topics covered include history of anesthesia, legal aspects, ethics, psychology, professional adjustments, department management, and organization.

193 Methods and Procedures in Anesthesia (3) — **Staff**

Lecture, group discussion, and audio-visual presentation. Topics covered include anesthesia techniques, positions in anesthesia, types of anesthetic required to meet the needs of different surgical specialties, and related topics.

194 Principles of Clinical Anesthesia (3) — **Staff**

At affiliated hospitals. Programmed supervised clinical training and experience. The student is assigned patients, organizes and administers anesthesia, and follows the patients through their total hospitalization. Designed to satisfy the American Association of Nurse Anesthetists requirements. Course is repeated for credit for 3 semesters, for a total of 9 semester hours.

195 Electronics for Medical Personnel (2) — **Staff**

Introduction to fundamental principles used in electronic instrumentation for monitoring patient status in operating room and intensive care unit. Power, biomedical voltages and transducers, blood pressure and heart rate monitors, displays, telemetry, special purpose instruments, safety hazards analysis techniques for technical equipment procurement. (Fall)

***302 Clinical Clerkship** — **Staff**

Clinical preoperative evaluation, surgical and obstetrical anesthesia, infant and adult resuscitation, inhalation therapy, management of patients in coma, shock, and other problems which may be encountered in medical practice. 1 week—Univ. Hosp., 1 week—Nat'l. Naval Med. Center or Walter Reed Gen. Hosp. (2-week periods throughout academic year)

380 Anesthesiology — **Weintraub**

Clinical experience in preoperative evaluation, surgical and obstetrical anesthesia, infant and adult resuscitation, inhalation therapy; monitoring and blood gas determinations. 4-week elective periods. Univ. Hosp.

384 Intensive Care Unit — **Shahvari, Zimmerman**

Evaluation and management of respiratory failure, rationale and use of automatic ventilators, chronic airway management, cardiovascular support, and intensive care. 4-week elective periods. Univ. Hosp.

386 Intensive Care Unit — **Rosenthal**

Evaluation and management of respiratory failure, rationale and use of automatic ventilators, airway management, cardiovascular support techniques, and intensive care medicine. 4-week elective periods. Nat'l. Naval Med. Center

*Required for medical students. Part of Med 308. Credit assigned after completion of Med 308.

390 **Extramural Anesthesiology Elective** (arr.)

The Department arranges for students to spend elective periods at institutions. Interested students should contact Dr. Herbert Weintra

Biochemistry

Chairman: C.R. Treadwell

Professors C.R. Treadwell, B.W. Smith, G.V. Vahouny, J.M. Bailey, H.H.

Professorial Lecturers W.W. Burr, Jr. *(Isotopes)*, E. Steers, Jr., G. Guroff, A. Schechter, E.P. Anderson, C.R. Merril, J.C. Smith, Jr., M.L. Minthorn

Associate Professor G.A. Walker

Assistant Professors L.L. Gallo, M.A. Vander Maten *(Research)*, R.W. Bry Jr. *(Research)*, J.C. Hyun *(Research)*

Assistant Professorial Lecturer C.L. Trichilo

Lecturer P.H. Fishman

*201 **Medical Biochemistry**

Lectures and laboratory; emphasis on basic principles and their relati to medicine. (Fall)

221–22 **General Biochemistry** (3 or 4–4 or 5) Vahouny, Gallo, and St

A comprehensive course in general biochemistry for graduate students biomedical sciences and undergraduate students in biology and chemist Generally graduate students *must* register for Bioc 221, 4 semester hour Bioc 222, 5 semester hours. However, graduate students registered Bioc 225-26, Micr 241-42, ForS 281-82 or Phys 223-24 may register Bioc 221-22 without the laboratory. With specific recommendation the undergraduate adviser and the department, undergraduate studen may register for Bioc 221, 3 semester hours; Bioc 222, 4 semester hou Prerequisite: Chem 152, 154. Material fee (graduate students only), $ a semester. (Academic year)

224 **Biochemistry of Enzymes** (1) E. Anderso

Course content alternates each year between biochemistry of enzymes enzyme reactions. Students may register for the course in consecutiv years and thereby cover the entire content. Prerequisite: Bioc 201 or (Fall)

†225–26 **Biomedical Instrumentation** (4–4) Smith and Staf

(Formerly Bioc 225 Biochemistry Procedures [3])

Same as ForS 281-82, Micr 241-42 and Phyl 223-24. Comprehensive study of theoretical and practical application of biomedical instrumenta tion to the separation, identification and quantification of materials interest to biomedical and forensic scientists. Laboratory fee, $50. (Academic year)

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* Required for medical students.

† An interdisciplinary course offered by the departments of biochemistry, forensic sciences, micro biology and physiology.

227 **Biochemistry Seminar** (1) **Bailey**

Current literature in biochemistry, mainly for graduate students, but open to limited number of specially qualified medical students. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

232 **Proteins and Amino Acids I** (1) **Steers, Schechter**

Prerequisite: Bioc 201 or 221. (Fall)

233 **Proteins and Amino Acids II** (1) **Steers, Schechter**

Continuation of Bioc 232. Methods for the study of protein confirmation; determination of active sites of enzymes; mechanisms of reactions at the active site. (Spring)

241 **Isotopes** (3) **Burr**

Theoretical characterization of isotopes and their applications in biology and medicine. Attention given to counting, health physics and radiation safety, autoradiography, chromatography. Laboratory fee for nonmedical students, $16. (Spring)

251 **Carbohydrate Metabolism** (1)

Prerequisite: Bioc 201 or 222. (Spring, even years)

252 **Biochemistry of the Brain** (1) **Staff**

For medical students; open to limited number of graduate students. Recent biochemical developments in structure, functions, and metabolic processes unique to the brain. (Spring)

254 **Human Nutrition** (1)

For medical students; open to limited number of graduate students. Application of nutritional principles in humans. (Spring)

256 **Biochemistry of Organ Function** (1) **N. Kramer**

For medical students; open to limited number of graduate students. Emphasis on biochemical processes unique to particular organ systems; application of these processes to evaluation of function. (Spring)

260 **Biochemistry of the Steroids** (1) **O. Dodek**

For medical students; open to limited number of graduate students. Basic chemistry of the steroids, pathways of biosynthesis and metabolism, regulatory mechanisms, physiologic effects, clinical measurement of endogenous steroids, clinical manifestations of steroid imbalance, steroid changes in pregnancy, and steroid therapy. (Spring)

262 **Biochemistry of the Lipids** (1) **Vahouny**

Discussion of topics of current interest, including digestion, energy production, biosynthesis, function in specialized tissues and subcellular particles. Content differs each time course is offered; may be repeated for credit. (Spring)

266 **Biochemical Genetics and Inherited Metabolic Diseases** (1) **Merril**

For medical students; open to limited number of graduate students. Biochemical aspects of genetics and contributions of molecular biology to understanding of human mutations and hereditary diseases. (Spring)

268 **Biochemistry of Bone and Muscle (1)** W

Study of structure, chemistry, and biochemistry as they relate to normal and diseased states of bone and muscle; emphasis on cu theories and techniques. (Spring)

279 **Research in Renal Function, Mutarotase, and Sugar Transport** B

Clinical significance of plasma mutarotase levels in kidney disease. 8-w elective periods.

280 **Research in Experimental Atherosclerosis** B

Study of factors influencing the development and course of atheroscler in rabbits. 8-week elective periods.

281 **Research in Biochemistry of Carbohydrates and Enzymes** B. So

Research in a problem already under investigation in the Department a project in related fields suggested by the student. 8-week elective perio

282 **Research in Biochemistry of Lipid Metabolism and Transport** Vahou

Biochemical investigation of a clinical problem involving lipids of spec interest to the student, or participation in existing research program in t Department. 8-week elective periods.

283 **Research in Metabolic Regulation within the Heart** Vahou

Studies on metabolic regulation and effects of drugs. 8-week electi periods.

284 **Research in Cholesterol Absorption and Metabolism** Gal

Participation in departmental research program involving the mechanis and prevention of cholesterol absorption. 8-week elective periods.

286 **Research in Biochemistry and Molecular Biology of RNA Tumor Viruses or DNA Polymerases of Mammalian Cells** R.C. Gallo

Investigative work at the National Cancer Institute, NIH. 8-week electiv periods or equivalent.

287 **Research on the Function of B_{12} Coenzymes in Cell Replication** Walk

Research in a problem under investigation in the Department. 8-week elective periods.

288 **LDH Viruses in Immunosuppression** Baile

Changes in plasma enzyme clearance and cellular immune mechanisms LDH virus infection. 8-week elective periods.

290 **Extramural Biochemistry Elective (ATT.)** Staff

The Department arranges for medical students to spend elective period at other institutions. Interested students should contact the Chairman o the Department.

* Dr. Gallo is Senior Investigator at the National Cancer Institute.

295 **Research in Biochemistry** (arr.) **Staff**

For 1st- and 2nd-year medical students and for graduate students. Participation in a project under investigation in the Department or one in a related field suggested by the student and approved by the staff. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) **Staff**

(Fall and spring)

398 **Advanced Reading and Research** (arr.) **Staff**

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Child Health and Development

Chairman: R.H. Parrott

Associate Chairmen: F.C. Green *(Child Health Advocacy)*, D.W. Delaney *(House Staff and Medical Care)*, J.C. Houck *(Research)*, A.M. Margileth *(Student Affairs)*, J.G. Randolph *(Surgical Division)*

Directors of Divisions: C.A. Rigg *(Adolescent Medicine)*, W.A. Howard *(Allergy)*, F.C. Green *(Ambulatory Medicine)*, L.P. Scott *(Cardiology)*, M.L. Elgart *(Dermatology)*, W. Hung *(Endocrinology)*, D.W. Delaney, *(General Medicine)*, S. Leikin *(Hematology)*, R. Chandra *(Anatomical Pathology)*, J.M. Hicks *(Clinical Laboratories)*, G.B. Avery *(Neonatology)*, J.C.M. Chan *(Nephrology)*, M.M. Platt *(Neurology)*, G.D. Eng *(Physical Medicine)*, J.M. Wiener *(Psychiatry)*, W.J. McSweeney *(Radiology)*, B.S. Epstein *(Anesthesiology)*, J.E. McClenathan *(Cardiovascular Surgery)* J.G. Randolph *(General Surgery)*, T.H. Milhorat *(Neurosurgery)*, D.S. Friendly *(Ophthalmology)*, D.W. McKay *(Orthopaedics)*, B.M. Webb *(Otolaryngology)*, L.W. Thompson *(Plastic Surgery)*, J.C. Kenealy *(Urology)*

Professors J.P. Adams, J.G. Randolph, R.H. Parrott, S. Doxiadis *(Visiting)*, S.L. Leikin, J.C. Houck *(Biochemistry)*, A.M. Margileth, B.S. Epstein, G. Avery, D.W. Delaney, W. Hung, L.P. Scott III, R.M. Chanock, D.W. McKay, J.E. McClenathan, W.J. McSweeney, F.C. Green, R.E. Reiger *(Research)*, M. Elgart, T.H. Milhorat, G.D. Eng, J.M. Wiener

Clinical Professors L.E. Hoeck, W.A. Howard, S. Berman, S. Ross, W. Stark, M.M. Parks, J.D. Noshpitz, M. Feitel, L. Cytryn, J. Spurlock, S.L. Baker, Jr.

Professorial Lecturer M. Jenkins

Associate Professors M.F. Gutelius *(Research)*, L.W. Perry, H.B. Richardson, Jr., A.B. Barnet, M. Majd, N. Movassaghi, D.W. Bailey, J.R. Puig, C.U. Battle, J.C.M. Chan, C.A. Rigg, G.P. August, C.D. Brandt *(Microbiology)*, R.P.

Altman, H.W. Kim, D.S. Friendly, B.S. Dunbar, A.B. Fletcher, D.L. Br
bill, L.W. Thompson, M.R.D. Wolf, J.M.B. Hicks, J.W.L. Todaro, G
Cochran

Associate Clinical Professors J.J. McFarland, Jr., S.I. Wolf, A.B. Colem
B. Olshaker, B.C. Straight, G.J. Cohen, J.J. Francis, A.F. North, Jr.,
Mahdavi, I.B. Bourne, A.J. Modlin, P.C. Brunschwyler, M. Fischer, F
Wohlford, H.T. Yates, B.H. Ong, H.R. Gold, J.L. Chamberlain III, K
Nelson, C.B. Robinowitz, B.M. Webb, D.J. Fishman

Assistant Professors M.M. Platt, J.H. Wise, H.A. Mangold, B.J. Peacock, D
Davis *(Research)*, A.H. Ficker, S.R. Shapiro, E.C. Esber, R.A. Cahill, R
Johnsonbaugh, L.W. Greenberg, M.T. Karna, K.D. Anderson, J.C. Srabste
S.S. Nason, B. Potter, K. Ravenscroft, Jr., V.A. Argumedo, G.W. Baile
F.M. Midgley, M.H. Thein, J.A. Tam, P.M. Farrell *(Research)*, M.C. E
wards, J.C. Fallon, A. Fields, P. Holbrook, T. Silber, E.J. Distelhorst, J
A.M. Glasgow, B. Guller, W.J. Rodriguez, E.S. Ohrlich *(Research)*, S.
Watson, B.M. McDonald

Assistant Clinical Professors J.L. Levine, I.D. Milowe, H.G. Clark, S. Moura
E. Friedman, M.S. Glatt, A.E. Marans, E.S. Denham, D.H. McKnew, Jr
L.A. Cove, M. Engel, M.A.V. Fox, V.L. Guandolo, L. Lefkowitz, J.G
Chopra, S.G. Werner, A.B. Zients, G.W. Hardman, Jr., G.A. Balfour, D.G
Albert, V.G. Ingram, G.W. Mella, G.A. Tripp, M. Brody, J.L. Hatleberg
K.L. Kaplan, R. Shearin, F.A. Pedreira, T. Sullivan, L.J. Tatnall, E. Taylor
S. Greenspan, R. Evans III, S.B.W. Wooten, C.E.J. Kimball, J.R.S. Malkm
D.R. Meers, B.A. Shaver, M.L. Renfield, B. Landau, A.H. Stein, P.J
Peebles, M.M. Davis, R.A. Nover, H.T. Yates, Jr., M.A.J. Fox, F.K. John
son, A.E. Schweitzer, J.M. Burgin, T.M. Connor, C.B. Feinstein, J.A. Lowe
W.L. McLean, M. Ortega, W.J. Hawes

Assistant Professorial Lecturer I.P. Weiss

Instructors A.M. Attallah *(Research)*, M.G. Beale, R.D. Castro, K. Kanagaling
am *(Research)*, D.W. Ochsenschlager, G.J. Buffone, A.L. Knasel, J.R. Sai
cedo, G.K. Blackburn, Jr., C.M. Naulty

Clinical Instructors H.H. Diamond, E.A. Black, H.E.C. Millar *(Psychiatry)*, H
Plotsky, D.A. Young, G. Joseph, M.L. Feldman, M. Rokni, B.S. Bruner, M.F
Lederman, M.E. Bravo, G.W. Daisley, Jr., K.G. Kassebaum, S. Amin,
V.W.C. Cheng, V. Chusuei, T. Frey, M.J. Guralnick *(Psychology)*, A. Tantr
sunthorn, R.H. Schwartz, C. Chisholm, M.W. Datch, F.L. Stroud, L.M
Beard, S.C. Goyal, H.L. Kaftarian, R.P. Dickey, R.R. Cioletti, A.R. Ugel
M.G. Walten, Jr., C.A.B. Schulman, M.D. Murphy, K.Z. Fowler, E.A.G
Pinder, M.D. Smokvina, G.M. Korengold, H.T. Vollero

Special Lecturers J.A. Bottiglione, C.J. Schulte III, J.W. Oberman, E.V. Soto,
R.F. Hinckley, S.M. Fisher, C.M. Berlin, Jr., M.I. Mones, R.S. Chandra,
L.L. Kulczycki, M. Schuelein, J.A. Kenney, Jr., M.I. Michael, B.J. Walsh,
J.L. Sever, P. Hamosh, I. Seiler, J.H. Bayly, E.G. Moses, C.E. Streetman,
Jr.

Arrangements to enroll in child health and development courses should be made with the instructor prior to registration.

***303 Pediatric Clerkship** — Margileth

Full-time, as part of resident team; ward rounds; work in outpatient department and specialty clinics under staff supervision; child psychiatry and child guidance, lectures, clinical conferences, grand rounds. Children's Hosp. (Annual, continuous 8-week rotation)

374 Mental Retardation — Cytryn

Diagnostic work-up of mentally retarded children and adolescents. Conferences, community resources. 4- or 8-week elective periods.

376 Pediatric Neurology — Platt

Participation in diagnostic and therapeutic studies on inpatients and outpatients. Rounds, conferences, seminars. 4- or 8-week elective periods. Children's Hosp.

377 Community Health Development — Hinckley

Acquaintance with public health preventive and community medicine as it is conducted by the Montgomery County, Md., Health Department. Opportunity to work in outlying health center satellites and central pediatric specialty clinics and to become familiar with school health programs and projects. 4- or 8-week elective periods.

378 Nutrition — Todaro

Therapeutic nutrition and nutritional content of foods taught in a variety of clinical circumstances. Rounds and tutorials with chief dietitian; well and sick baby clinic, adolescent clinic, and newborn nursery. 4-week elective periods. Children's Hosp.

380 Clinical Pediatrics — Margileth

Full-time, as part of resident team; wards, outpatient department, and specialty and emergency clinics under staff supervision. Participation in diagnostic studies, therapeutic procedures, rounds, and conferences. Acting internships are available. 4-week elective periods. Children's Hosp.

381 Pediatric Allergy — Howard

Introduction to pediatric allergy, clinics and wards, some experience in experimental techniques and preparation of extracts. 4- or 8-week elective periods. Children's Hosp.

382 Pediatric Radiology — McSweeney

Diagnostic and therapeutic radiology in infants and children; special diagnostic procedures. 4-week elective periods. Children's Hosp.

383 Cystic Fibrosis — Kulczycki

Detailed diagnostic and therapeutic procedures including pulmonary and nutritional manifestations and complications as seen in cystic fibrosis patients, from the newborn to those in their third decade. Medical, surgical, psychological, and social problems of cystic fibrosis patients and their families. 4-week elective periods. Children's Hosp.

384 Newborn and Premature — Srabstein

Principles and practices of neonatology emphasizing basic physiological processing; their relationship to normal development and to diseases in the newborn period. 4-week elective periods. Univ. Hosp.

* Required for medical students.

385 Child Psychiatry W

Observation of and appropriate participation in diagnostic, consul and follow-up work with hospitalized children and psychiatric outpa Clinical and theoretical conferences. Orientation to community chil chiatry and child mental health as part of service delivery system. 4 elective periods.

386 Pediatric Hematology I

Clinical and laboratory studies of infants and children with hemat disorders; bone marrow examinations. 4-week elective periods. dren's Hosp.

387 Clinical Pediatrics

Care of newborn and children on inpatient basis; diagnostic studies, apy; assigned reading. 4-week elective periods. Fairfax Hosp.

388 Newborn Medicine Avery, Fle

Observation and participation in the care of infants. 4-week elective ods. Children's Hosp.

389 Pediatric Cardiology L. Scott, P

Physical diagnosis of congenital and acquired heart diseases, interp tion of electrocardiograms and vectorcardiograms, cardiac catherizati 4-week elective periods. Children's Hosp.

390 Extramural Pediatric Elective (arr.)

The Department arranges for students to spend elective periods at o institutions. Interested students should contact Dr. Andrew Marg after they have obtained the following: (1) a letter of approval from Dean for Academic Affairs, (2) a description of the course or cou to be taken and (3) a description of the affiliations of the other ins tion.

391 Cell Biology Research Hos

Biochemical studies of normal and diseased human cells in culture. or 8-week elective periods. Children's Hosp.

392 Adolescent Medicine Clerkship R

Study of the normal developmental problems of adolescence. Experie in the medical care of adolescents with consultative and teaching con ences. 4- or 8-week elective periods. Children's Hosp.

393 Pediatric Anatomical Pathology and/or Clinical Pathology Hicks, Chan

Participation in necropsy and surgical pathology service. Clinical cor lation of histopathology, laboratory studies, and clinical disease. 4-we elective periods. Children's Hosp.

394 Pediatric Clinical Laboratory Hicks, Margi

Laboratory studies of infants and children correlated with clinical dise In-depth review of laboratory diagnostic studies. 4-week elective perio Children's Hosp.

395 Endocrinology Hung, Aug

Evaluation of patients with metabolic and endocrine disorders. Planni of diagnostic and therapeutic programs of patients in an office setti and possibly inpatients. 4-week elective periods. Children's Hosp.

396 The Handicapped Child and Chronic Disease — **Battle**

An approach to the care of the handicapped child, in a clinical situation and through tutorial readings. 4-week elective periods. Hosp. for Sick Children.

397 Nephrology — **Chan**

Training in clinical nephrology and hemodialysis; research opportunities in Vitamin D metabolism, acid-base physiology, intravenous nutrition, renal physiology, and calcium metabolism. 4-week elective periods. Children's Hosp.

398 Comprehensive Care — **Oberman**

Participating in both sick- and well-child care as administered in a comprehensive setting; experience in multidisciplinary approach; cooperative planning with other community agencies. 4- or 8-week elective periods. Comprehensive Health Care Program.

399 Community Pediatrics — **Greenberg**

For students primarily interested in the private practice of pediatrics. Care in the nursery and pediatric ward of a community hospital; exposure to private practice of pediatrics in an office setting. 4-week elective periods. Holy Cross Hosp.

Clinical Engineering

Chairman: W.S. Yamamoto

Professors W.S. Yamamoto, H.V. Pipberger, B. Waxman *(Visiting)*
Adjunct Professors C.E. Huckaba, J.K. Weston
Professorial Lecturer B. Kemp
Associate Professor R.A. Dunn *(Research)*
Associate Professorial Lecturer G.B. Devey
Assistant Professors A. Berson *(Research)*, H.Z. Pipberger *(Research)*, U.E. Ruttimann, F.H. Orthner, R. Bassir
Assistant Clinical Professor P.R. Moyer

101 Practical Computing for Paramedics (3) — **Staff**

For students in the radiologic science and administration degree program. Designed to familiarize the student with a computer system.

351 Clinical Engineering for Medical Students — **Staff**

Students will be assigned for tutorial instruction in the principles and practices of clinical engineering. Participation in current laboratory projects, assigned reading and study. Participation in the Health Care Technology Seminar is required during the period of the elective. Students should have some basic knowledge of mathematics or physics, or some prior exposure to engineering disciplines. Consultation with the staff is required prior to enrollment. 4-week elective periods. Warwick Bldg.

353 Medical Computing

Aspects of computer usage including the preparation and execut programs which involve clinical or research applications, such as analysis, pulmonary function calculation, medical file management, ematical modeling, data processing, and managerial computing. In cases, the staff may be able to supervise a student in an area choice; in general, however, the program will consist of formal class instruction as well as individual study. Participation in the Health Technology Seminar is required during the period of the elective. 8-week elective periods (may be taken in two divided 4-week per Warwick Bldg.

354 Automated Medical Measurement Systems

Under supervision, the student will work in the daily operation multiphasic screening clinic and participate in the process of new i mentations and in evaluation of the system. Review of variabilit clinical findings and the problems of the variability of clinical obse tion. Participation in the Health Care Technology Seminar is requ during the period of the elective. 4-week elective periods. Warwick

390 Extramural Clinical Engineering Elective

The Department will sponsor students to spend one or more elec periods at other institutions. Interested students must have the appro of the Chairman of the Department.

Dermatology

Chairman: M. Elgart

Professors R.S. Higdon *(Emeritus)*, M. Elgart

Associate Clinical Professors W.M. Narva, O.G. Rodman

Assistant Clinical Professors C.S. Brown, P.L. Repetto, Jr., D. Mitchell, L. Eanet, M.L. Turner, T.P. Nigra, D.M. Cryan

Assistant Professor S.H. Berk

Clinical Instructors H.S. Golomb, R.N. DeAngelis, D.L. Pierson, D.N. Robin A.R. Ugel, R.A. Katz

Special Lecturers N. Kanof, J.A. Kenney, Jr., Z.W.Z. Mally

380 Dermatology Clinic

Elg

Conferences, lectures, and attendance at dermatology clinic where p tients with wide variety of dermatoses are seen. Diagnosis and treatme of common skin disorders. Dermatologic surgical procedures, techniq for using liquid nitrogen, culture and identification of fungi, microsco diagnosis of common cutaneous diseases. 4-week elective periods. U Ambulatory Care Ctr.

381 Dermatology Clinic

Mitch

Same as Derm 380. 4-week elective periods. Group Health Asso., Inc.

382 **Dermatology Clinic** — **Rodman**
Same as Derm 380. 4-week elective periods. Walter Reed Gen. Hosp.

383 **Dermatology Clinic**
Same as Derm 380. 4-week elective periods. Andrews Air Force Base Hosp.

384 **Private Office Practice** — **Repetto**
4-week elective periods.

385 **Private Office Practice** — **Ennet**
4-week elective periods.

386 **Private Office Practice** — **Robins**
4-week elective periods.

387 **Clinical Dermatology** — **Fischman***
Introduction to clinical dermatology. Working in the out-patient dermatology clinic, observing in-patient consultations, reviewing histopathology, performing skin biopsies. Close supervision by staff. Interview required. 4-week elective periods. VA Hosp.

388 **Dermatology in General Medicine** — **Nigra**
Dermatology as related to internal medicine. Mechanisms of diseases; in-depth approach to dermatologic-medical problems; advanced reading. 4-week elective periods. Wash. Hosp. Center.

390 **Extramural Dermatology Elective** (arr.)
The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

Health Care Sciences

Acting Chairman: T.E. Piemme

Professors T.E. Piemme, F.C. Green
Professorial Lecturer R.S. Hanft
Clinical Professor P.J. Sanazaro
Associate Professors M. McCally, R. Keimowitz, J. LaRosa, S. Marinoff, S.A. Schroeder
Associate Clinical Professors P. Birk, S.J.N. Sugar
Assistant Professors J.M. Wise, M.R. Silverman, B.B. Doyle, E.W. Sutherland III, P.J. Steinglass, G.W. Bailey, L. Sank, M.A. Newman, N.W. Lindenmuth, J.C. Fallon, A.W. Stone, P.M. Buttaravoli
Assistant Clinical Professors G.A. Ellsworth, S.F. Fiscina

* Dr. Fischman is Chief of the Dermatology Service at the Veterans Administration Hospital.

Assistant Professorial Lecturers J.K. Miller, C.J. Savarese, S.E.H. Raviv

Instructors K.R. Sorem, W.A. Stein, K.R. Katterjohn, D.M.T. Hrushesky, Shapiro, G. Merriweather

Clinical Instructors N.T. Connally, M. Greene, V.T. Miller, R.A. Berens W.D. Lassek, J.A. Sandler, J.M. McGinnis, M.J. Fliegelman, S.P. Staal, E. Hume, V.V. Kalbian, J.V. Dichoso, C.E. Streetman, Jr., W. Knaus

Special Lecturers J.W. Argent, Jr., D.G. Birdwell, W.H. Brigge, C.W. Buch V.D. Buechler, J. Carlisle, Jr., J.D. Chapman III, W.R. Chiarulli, E.F. Cr tree, J.S.M. Dimapilis, M.K. Howell, Jr., J.R. Howery, E.E. Jones, H.N. L sen, J.B. Laskowski, J.P. Marceau, A.F. Marin, S.L. McCourt, L.E. McGui J. Monica, J.L. Preston, R.H. Price, G. Rivers, F.E. Rollins, E.M. Strehl P.E. Trievel, R.E. Webber, R. Wynn

Courses numbered from 10 through 96 are limited to military personnel in th Medical Service Technology Program.

10 Anatomy and Physiology (2) *Staf*

Study of the human body: esteology, arthrology, myology, hematolog immunology; circulatory, respiratory, digestive, endocrine, excreto nervous, and reproductive systems.

11 Applied Anatomy and Physiology (6) *Staf*

Application of anatomical and physiological principles. Control of hem orrhage, methods of resuscitation, management of shock, relief of pai physical examination, nutrition, fluid and electrolyte balance, respirator conditions, childbirth.

15 Pharmacology and Toxicology (5) *Staf*

Study of medicinal substances used in the treatment of man: pharmaceu tical mathematics, terminology, preparations, compounding, physiologica action and potential toxic reactions of certain drugs, legal aspects of dru regulations.

16 Clinical Laboratory Techniques and Procedures (2) *Staf*

Study of certain laboratory procedures used in basic health maintenance Use of microscope, complete blood count, acid-fast stain, urinalysis, blood sedimentation rate, RPR card test, coagulation and bleeding time, blood grouping, blood typing.

22 Introduction to Epidemiology (2) *Staf*

Study of common communicable diseases, immunologic factors and pro cedures. Contact interviewing and reporting of the communicable diseases.

67 Disaster Sanitation (2) *Staf*

Survey of nuclear, biological, and chemical hazards; emphasis on detec tion, personnel protection, and related functions.

68 Environmental Sanitation (3) *Staf*

Study of certain environmental factors which contribute to human health Food, water, living and working spaces, economics, and pest control.

92 Medical Material Management (5) *Staf*

Study of the management of material in the medical facility. Budget and budgeting process, expense operating budget, purchasing, material receipt

and inspection, inventory of equipment and supplies, controlled medicinals, stock record cards, surveys and adjustments, classes of plant property, property accountability, storage requirements.

93 **Health Systems Administration I** (4) **Staff**

Study of health systems organization. General office procedures, basic typing methods, standard subject identification codes, filing procedures, records disposal, security of patient information, correspondence, procedural manuals.

94 **Health Systems Administration II** (4) **Staff**

Study of planning procedures in a health system. Planning of office systems and procedures, office environment and location planning, office quality control, work measurement methods, authority and organizational relationships, principles of office organization, employee supervision.

95 **Records Management** (6) **Staff**

Study of public health records management. Classification of personnel, personnel records, promotions, educational services, career development, personnel orientation, medical care eligibility, patient data systems, statistical analysis.

96 **Clinical Experience: Medical Service Technology** (6) **Staff**

Supervised experience and research involving the application of principles learned in didactic experience to the practical situation.

Courses numbered 109 through 199 are for students in allied health programs.

109 **Human Behavior I** (2) **Doyle**

Theory and techniques of effective communication with patients; counseling and psychotherapy. **(Fall)**

110 **Structure of the Human Body** (3) **Staff**

(Formerly HCS 101 Normal Structure and Function of Man [9])

Lecture, film and demonstration. Gross and microscopic makeup of the human body covering the major organ systems: cellular, musculoskeletal, nervous, endocrine, cardiovascular, respiratory, gastrointestinal, urinary, reproductive, and integrated.

111 **Function of the Human Body** (3) **Staff**

(Formerly HCS 101 Normal Structure and Function of Man [9])

Lecture, film and demonstration. Function and processes of the human body covering the major organ systems.

112 **Molecular Basis of Matter and the Human Body** (3) **Staff**

(Formerly HCS 101 Normal Structure and Function of Man [9])

Lecture, film and demonstration. Composition and chemical properties of inorganic matter. Biological and chemical processes and phenomena of the human body as they relate to normal and diseased states.

113 **Medicine and Society** (1) **Piemme**

Survey of the history of medicine, medical ethics, sociological and anthropological aspects of medical practice, major issues facing modern medicine in the United States. **(Fall)**

116 Medical Terminology (1) Wi
(Formerly two credits)
Terminology and vocabulary basic to all areas of medical science, ho
pital services, and allied health specialties. (Fall)

119 Introduction to Patient Care I (1) Sta
Patient histories, routine physical examinations, use of the routine equip
ment of clinical examination. (Fall)

125 Manifestations of Disease (8) Sta
Pathologic and abnormal structure and function encountered in clinica
disease states. A functional approach to clinical medicine, including sig
symptoms and diagnosis of disease states. Prerequisite: HCS 110, 11
112. (Spring)

131 Human Behavior II (2) Doyl
Continuation of HCS 109. Prerequisite: HCS 109. (Spring)

134 Introduction to Patient Care II (3) Sta
Continuation of HCS 119. Prerequisite: HCS 119. (Spring)

137 Dynamics of the Life Cycle (1) Sta
Four hours a week for 20 weeks. Issues surrounding the more contro
versial topics in modern health care delivery. (Spring)

140 Clinical-Pathological Correlation (0) Piemm
Three hours a week for 20 weeks. Instruction in the format for cas
presentations as well as the proper methods used for clinical integration
of signs and symptoms of disease. Prerequisite: HCS 116. (Spring)

142 Nurse Practitioner Seminar I (2) Sta
(Formerly Nursing Seminar I)
Family dynamics, role resocialization and current issues influencing de
velopment of the nurse practitioner role.

143 Nurse Practitioner Seminar II (3) Sta
(Formerly Nursing Seminar II)
Continuation of HCS 142.

144 Nurse Practitioner Seminar III (1) Sta
(Formerly Nursing Seminar III)
Continuation of HCS 142 and 143.

146 Surgical and Diagnostic Procedures (3) Sta
(Formerly Animal Surgery)
Fundamentals for performing several diagnostic and surgical procedures
Basics for preparation and execution of procedures such as venipuncture
suturing, intravenous infusion. Proper surgical decorum, development o
working knowledge of various surgical instruments and sutures. 1
week course.

147 Introduction to Radiology (2) Sta
Emphasis on basic language, science, and principles of radiology, inclu
ing such aspects as safety, positioning, protection-requesting studies, e
Basic elements of topographic anatomy as applied to radiology. The di
ferentiation of abnormal from normal on chest, abdominal, and extremi

films. Basic pattern recognition along with a systematic approach to each x-ray interpretation. Appropriate use and therapeutic and diagnostic value of nuclear medicine studies as well as special procedure studies in radiology. Prerequisite: HCS 125. (Summer)

148 **Introduction to Electrocardiography** (2) **Staff**

Emphasis on the performance of a technically competent electrocardiogram by each student. Basic theory behind electrocardiography as well as interpretation of basic EKG patterns. Common errors of taking and reading EKG's. Identification of common normal and abnormal wave patterns on EKG's. Value and appropriate use of echocardiography and phonocardiography, as well as the principles and technical competence of performing simple exercise tolerance testing. (Summer)

150 **History-taking Review and Theory** (1) **Staff**

(Formerly zero credits)

Theories of taking, presenting, and writing up a competent history; e.g., traditional approach, problem-oriented approach, etc. Techniques for gathering important, yet potentially embarrassing and threatening, areas of the patient's history. Discussion and direct use of a variety of techniques and approaches for collecting historical information from different patient types. Opportunities for live, observed patient interviews, constructively evaluated. Discussion of oral and written presentation of histories taken outside class. Prerequisite: HCS 134. (Summer)

151 **Clinical Pharmacology** (2) **Staff**

Day-to-day clinical situations for discussion of the appropriate use of some of the more common drugs in a primary care practice. Dosages, actions, routes of administration, indications, and contraindication as applied to the specific clinical examples. Advantages, disadvantages, and reasons for deciding on the primary drug of choice and possible alternative therapy. When and how to use *PDR*. Review and discussion of the importance and advantages of taking an accurate and complete drug history. Prerequisite: Phar 158. (Summer)

152 **Introduction to Basic Laboratory Medicine** (3) **Hammersberg**

(Formerly four credits)

Theory, performance, and interpretation of some of the more important routine basic clinical laboratory tests that can be performed in a physician's office, such as complete blood counts with differentials, staining and reading smears, urinalysis and urine cultures, routine chemistries (sugar, BUN, electrolytes), and microbiological culture and staining techniques and organism identification. Lecture and demonstration with appropriate use of audiovisuals. Appropriately supervised and evaluated performance of these tests in a laboratory setting. Prerequisite: Path 129. (Summer)

153 **Gynecology Outpatient: Nurse Practitioner** (3) **Staff**

Three-week required rotation for nurse practitioner students. Management of gynecological problems in ambulatory setting.

154 **Psychiatric Outpatient: Nurse Practitioner** (2) **Staff**

Two-week elective rotation for nurse practitioner students. With guidance and approval of adviser, students develop individual study and learning objectives.

157 Primary Care Preceptorship: Nurse Practitioner (6)
Six-week required rotation for nurse practitioner students. Covers aspects of patient management in ambulatory setting.

160 Medical Inpatient (4)
Six-week required rotation for Physician's Assistant students. Attendance required at all work rounds, teaching rounds, noon conferences, and grand rounds of the medical service. (Fall, spring, summer)

163 Medical Outpatient (4)
Six-week required rotation for Physician's Assistant students. Introduction to patient management problems in ambulatory setting.

165 Medical Outpatient: Nurse Practitioner (arr.)
Required rotation for nurse practitioner students, arranged with approval of adviser. Exposure to all aspects of patient management in ambulatory setting.

166 Surgical Inpatient (4)
Six-week required rotation for Physician's Assistant students. In-depth experience in management of the pre-operative and post-operative care of the surgical inpatient; attendance required at all surgical rounds. (Fall, spring, summer)

169 Obstetrics and Gynecology (4)
Six-week required rotation for Physician's Assistant students. Exposure to outpatient obstetrical and gynecological problems; attendance required at all lectures, rounds, and conferences applicable to staff on the obstetrics-gynecology service. (Fall, spring, summer)

170 Obstetrics: Nurse Practitioner (2)
Two-week elective rotation for nurse practitioner students. With guidance and approval of adviser, students develop individual study and learning objectives.

171 Pediatric Outpatient: Nurse Practitioner (3)
(Formerly Pediatrics)
Three-week required rotation for nurse practitioner students. Ambulatory pediatric practice.

172 Pediatric Outpatient (4)
Six-week required rotation for Physician's Assistant students. Exposure to ambulatory pediatric medicine. Attendance required at all rounds and conferences.

175 Primary Care Preceptorship (12)
Eight-week required rotation for Physician's Assistant students. Exposure to all aspects of the practice of medicine, including administration, in a community setting; rounds with attending physician in a hospital setting. (Fall, spring, summer)

178 Emergency Medicine (4)
Six-week required rotation for Physician's Assistant students. Opportunity to deal with acute life-threatening, traumatic, and psychiatric emergencies; emphasis on learning technical skills such as reconstructive suturing; attendance required at all applicable conferences; exposure to surgical and medical emergency management problems. (Fall, spring, summer)

179 **Emergency Medicine: Nurse Practitioner** (2) **Staff**
(Formerly Emergency Room)

Two-week required rotation for nurse practitioner students. Medical and surgical emergency management problems.

195 **Second Careers in Allied Health** (arr.) **McCally**
(Formerly two credits)

For persons in the second career program. Designed to facilitate student integration into educational routine and to increase student awareness of the health field. Lectures, discussions, guest speakers, and outside readings reinforced by group process. Renewal and development of learning skills necessary to complete the selected training program. Content includes allied health careers, manpower needs, career and training program planning. (Fall and spring)

196 **Issues in American Health Care** (arr.) **McCally**

Field work combined with academic study of present American health care system and its problems: cost, quality of care, delivery of care, ethical issues, health education, consumer issues. Field placements (12–20 hours a week) in appropriate health-related activities. Admission by permission of instructor. (Fall and spring)

198 **Psychiatry** (4) **Staff**

Six-week required rotation for Physician's Assistant students. Designed to acquaint student with identification and management of psychiatric illness. Attendance required at all lectures, rounds, and conferences.

199 **Independent Study** (4) **Stein**

Four-week required rotation in area chosen by individual student. Objectives for chosen area determined before enrollment. Adviser's approval required for area of study and learning objectives.

301 **Clerkship in Primary Care** **Staff**
(Formerly HCS 300)

For third-year medical students. Training in care of patients in ambulatory setting. Includes participation in University's prepaid health plan (HMO), emergency room, and office practice of general internists, general pediatricians, and family practitioners. Emphasis on skills in specialties which contribute to physician's capacity to care for common minor illnesses. Includes exposure to office practice of orthopaedics, otolaryngology, dermatology, and ophthalmology. Participation with District of Columbia Fire Department in responding to ambulance calls. Lecture series provides foundation for office management of common illnesses managed in ambulatory setting. 8-week elective periods throughout the academic year.

350 **Ambulatory Health Care** **Piemme**

For senior medical students. Involvement in office practice of primary care physician or group of physicians in rural or inner-city area. 4-week elective periods, or 8-week elective periods during which student participates in projects relating to health care delivery. Such projects include medical audit, study of organization of health services, and problems of underserved populations. Exchange with similar program in other institutions is possible, especially for those participating in model family practice units.



Medical student (right) assisting with patient examination during a clerkship in the department of health care sciences, the University's family practice departme

360 **Emergency Health Care** Pierce

For senior medical students. Assignment to an emergency room in the District of Columbia. Instruction by full-time and resident emergency room staff. Emphasizes cardio-pulmonary resuscitation and management of trauma, drug overdose, coma, and common illnesses and injuries in emergency care setting. 4-week elective periods.

390 **Extramural Health Care Sciences Elective** (arr.)

The department will sponsor students to spend one or more elective periods at other institutions. Approval of the department chairman required.

Interdisciplinary Courses

FIRST-YEAR MEDICAL STUDENTS are required to take two interdisciplinary courses: Idis 211 *The Cell in Medicine*, administered by the departments of anatomy, biochemistry and physiology; and Idis 212 *Neurobiology*, administered by the department of anatomy and physiology. Staff

211 **The Cell in Medicine**
(Formerly Cell Biology)

Same as Anat 211 and Phyl 211. An integrated survey of the structure, function, and metabolism of the cell, as an introduction to the medical sciences.

212 **Neurobiology** **Staff**

Same as Anat 212 and Phyl 212. An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstration, and laboratory.

Clinical Sciences, an interdisciplinary program, is required of medical students in the second year. By means of panel discussions, lectures, seminars, case presentations, demonstrations, and examinations of patients, it provides students with basic instruction in various clinical subjects and prepares them professionally and personally for the clinical clerkships and career electives in the third and fourth years. The program is coordinated by a task force appointed by the Committee on Educational Policy of the School of Medicine and Health Sciences. The task force consists of representatives from the departments responsible for teaching courses in the program: Robert Keimowitz *(Chairman)*, Department of Medicine; H.G. Mandel, Department of Pharmacology; Winfield Scott, Dean's Office; F.N. Miller, Jr., Department of Pathology; Brian Doyle, Department of Psychiatry and Behavioral Sciences; and Jack Kravitz, second-year student. In addition to Idis 301 *Introduction to Clinical Medicine* (see below), the program consists of Path 201 *Pathology*, Phar 201 *Pharmacology*, and Pchi 201 *Behavioral Sciences*.

230 **Introduction to Health and Patient Care**

A year course. Four major components: *Emergency Medicine*—12 didactic sessions; skills of elementary emergency medicine and first aid; includes a laboratory in cardiopulmonary resuscitation. *Issues in Health Care*—12 sessions, lecture, symposium, and discussion; introduction to critical issues in the rapidly changing American health-care system; organization of health care, medical economics, medical education, quality of care, ethics, and related issues. *Communication Skills*—nine small-group laboratory sessions; interpersonal communication skills upon which clinical interviewing and counseling are based; film strip demonstrations of effective listening skills and video-tape recall of role-played interviews. *Normal Physical Examination*—four laboratory sessions; opportunity to learn techniques of normal physical examination.

301 **Introduction to Clinical Medicine** **Staff**

A year course. An integrated organ-oriented, interdepartmental course providing fundamental instruction in anesthesiology, child health and development, dermatology, gynecology, internal medicine, neurology, obstetrics, ophthalmology, psychiatry, radiology, and surgery; emphasis on physical diagnosis and laboratory medicine. Includes Life Cycle, dealing with the interpersonal relationships of the physician and his patients and their families.

Medical and Public Affairs

hairman: M. Head

Professor M. Head

Professorial Lecturer R.D. Cotton

Associate Professors F.J. Kavanaugh *(Research)*, R.H. Ross *(Research)*

Assistant Professors E. Waters, Jr. *(Research)*, N.W. Matheson *(Research)*, J. Heller *(Research)*, I.C. Mohler, Jr. *(Research)*, S.S. Rogers *(Research)*, H.K. Kolbe *(Research)*

351 **Forensic Medicine** (2) Sharpe*, Head, Fiscina

Open to 2nd-year medical students. Examples drawn from the range of problems arising when the professional interests of lawyers and physicians overlap. Problem contexts include malpractice, personal injury litigation, licensure and discipline, ethics and economics, hospitals and other institutions of practice, and compelled treatment. (Fall)

354 **Seminar: Health Care Delivery Systems** (2) Sharpe*, Fiscina

The role of lawyers and physicians in national health care legislation-making: issues of design, finance, and administration; problems in reconciling the expectations of the users and providers of health care services. Limited enrollment. (Spring)

Medicine

Acting Chairman: J.N. Sheagren

Associate Chairman: G.A. Kelser, Jr.

Directors of Divisions: G.A. Kelser, Jr. *(Cardiology)*, W.O. Dobbins III *(Gastroenterology)*, L.S. Lessin *(Hematology-Oncology)*, J.N. Sheagren *(Infectious Diseases)*, K. Wipplinger *(Internal Medicine)*, K.L. Becker *(Metabolic and Endocrine Diseases)*, R. Goldstein *(Pulmonary Diseases)*, I.G. Tamagna *(Rehabilitation Medicine)*, A.E. Parrish *(Renal Diseases)*, W.R. Felts, Jr. *(Rheumatology)*

Professors M.J. Romansky, J.M. Evans, C.S. Tidball *(Research)*, A.E. Parrish, F.W. Wolff, I.G. Tamagna, J.J. Feffer, T.E. Piemme, L. Bernstein, G.A. Kelser, Jr., H.V. Pipberger, H.J. Zimmerman, J.A. Curtin, D.J. Massaro, R.P. Kaufman, T.O. Cheng, J. Lindsay, Jr., F. Leonard *(Research—Rehabilitation Medicine)*, W.O. Dobbins III, J.M. Bacos, E.R. Simon, A.C. Hollinshead *(Research—Pharmacology)*, N.C. Kramer, J.D. Finkelstein, L.S. Lessin, W.P. Baker, W.M. Lukash, J. Sode, D. Reiss, K.L. Becker, W.F. Barth, V.T. DeVita, G.D. Eng, I.I. Hsu, M. Mourad, L. Pierce, H.E. Ratcliffe, J.N. Sheagren, D. Hawkins *(Research)*, D. Castell

Clinical Professors J.J. Rheingold, T.S. Sappington, A.B. Rosenbaum, T.J. Greenwalt, B. Manchester, M.H. Stolar, C.W. Thompson, M. Gusack, S.M. Fox III, E.P. Parker III, H.M. Silver, S.D. Loube, M.S. Artenstein, M. Fuchs, B. Nelson, H.L. Kamenetz

Adjunct Professor J.P. Naughton

Professorial Lecturer W.C. Roberts *(Cardiology and Pathology)*

* Dr. Sharpe is Professor of Law in the University's National Law Center.

Associate Professors W.R. Felts, Jr., J.B. O'Connell, A.F. Mastellone *(Physical Medicine)*, K. Wipplinger, M.J. Jackson *(Research)*, P.A. Gorman, J.C. Rios, J. Stengle, W.H. Scott, P. Witorsch, R. Keimowitz, J. LaRosa, G.D. Massaro *(Research—Pulmonary Diseases)*, C.M. Voyles, D.S. O'Leary, G.P. Schechter, S.A. Schroeder, W.P. Fortune, B.M. Domm, D. Weiner, M.S. Gold, R.B. Johnson, S.V. Spagnolo, J.E. Zimmerman, G.S. Folsom *(Research)*

Associate Clinical Professors J.W. Latimer, Jr., H.D. Ecker, C.W. Jones, M. Mensh, F.J. Murray, M.H. Rosenberg, J. Kleh, J.P. Mann, E. Adelson, A. Ruskin, L.J. Thomas, W.O. Bailey, Jr., R.B. Benedict, S.W. Kirstein, I. Kessler, W.D. Brill, C.A. Schulman, A. Baer, J.M. Pisani, S.W. Bush, J. King, M.H. Jacobson, R. Standard, E.J. Leonard, J. Fenton, P. Birk, R.B.W. Smith, L.B. Hobson, S.H. Danovitch, A.W. Danish, A.A. Lear, O.W. Donnelly, S.J. Talpers, R. Scalettar, R.S. Wilkinson, M.S. Wolfe, D.A. Morowitz, N.L. Christopher, G.H. Nachnani, R.A. Fischer, R.M. Kaufman, M.J. Stern, N.P. Trujillo, L.M. Weiss, R.K. Sarin, D. Ein, D.A. O'Kieffe, J.R. Shapiro, P.V. Holland, S.J. Wolin, W.J. Tompkins

Associate Professorial Lecturers J.C. Penhos, R.R. Blanck

Assistant Professors P.M. Berkman, C.H. Chan, D.H. Goodman, W.S. Chiu, M.H. Cohen, J.F. Meyer, P.O. Periman, K.J. Dickie, A.M.S. Thompson, R.A. Goldstein, P.P. Klug, B.E. Sherwin, J.A. Snow, S.H. Mendelson, A. Guha, B.E. Fossieck, Jr., A.L. Ginsberg, H.J. Gorfinkel, H.B. Marsh, D.R. Rosing, E.W. Sutherland III, K.H. Chase, J.B. Taylor, D.B. Gail *(Research)*, M. Enders, B. Arling, F.H. Corcoran, R.D. Gaskins, L.P. Georges, K. Goldstein, E. Perlin, I. Scher, K. Mallik *(Research)*, L.L. Vertuno, O.C.L. Silva, P. Cohen, M.A. Newman, N.W. Lindenmuth, A.N. Amigable, S.E. Anderson, Jr., L.D. Bohan, D.F. Fragnul, J.P. Kirchner, L.W. Raymond, A.H. Rowberg *(Research)*, A.W. Stone, C.V. Tuazon, E.C. Flores, M. Saeb, J.C. Donaldson, J.C. Babka

Assistant Clinical Professors D. Horwitz, S.T. Gibson, M.H. Rose, A. Friedman, J.W. Long, T.L. Hartman, B. Rabkin, L.A. Craig, Jr., A. Seltzer, C.E. Law, Sr., H.O. Mott, N.H. Rubenstein, B.H. Ostrow, W.R. Ehrmantraut, G.A. Chapman, S. Babin, Jr., J. Crowell, D.S. Davis, F.K. Harris II, R.F. Dyer, H.I. Passes, R.S. Poole, H.C. Sadin, W.L. Hall, M.A. Sislen, G.C. Buchanan, G.T. Economos, I. Ardam, S.E. Barr, H.A. Moskovitz, J.T. Hagenbucher, G.N. Polis, J.P. Lucas, F. Chucker, L.H. Biben, W.H. Harvey, W. Kurstin, L.H. Fenton, P. Schlein, D.J. Hand, P.A. Haber, G. Balsamo, G.J. Thorpe, B. Grand, C. Rudzki, H.C. Singer, E.B. Thompson, R. Schoenfeld, P.R. Lenz, M.M. Shefferman, A.M. Mondzac, B. Kotelanski, R.J. Karpick, M.S. Maillis, W.Y.K. Goo, M.J. Halberstam, J.F. Mermel, S.N. Richman, T.P. Dwyer, S.M. Fidler, A. Muller, R.A. Ratner, A. Segal, R.B. Castell, B.L. Manalo, P.G. Ventry, R.G. Knodell, M.J. Haut, R.A. Nicklas, R.F. Cioffi, F. Meyers, R.W. Turner, S.A. Schwartz, L.F. Barker, D.D. Haut, A.J. Anderson, P.P.L. Chang, H.S. Mirsky, M. Donowitz, G.R. Irwin, J.A. Kark, J.N. Ramey, D.B. Simon, R.A. Noble, S.M. Phillips, H.A. Schwartz, G.R.G. Werth, P. Assatourians, C.J. Bier, J. Brandes, R. Evans III, D.L.B. Goldberg, S.G. Goldberger, A.A. Oboler, M. Phillips, J.D. Robinson, G.W. Ward, Jr., I. Weiszer, M.I. Bull, B. Hecht, D.H. Boldt, J. Fatemi, D. Yoo

Instructors R.E. Rose *(Research)*, A.G.S. Fry *(Research)*, R.A. Muesing *(Research)*, F.M.S. Patterson, Jr., S. Scott, Jr., T.V. Kuzmowych

Clinical Instructors N.K. Bohrer, N.G. Goodman, L. Ruckstuhl, R. Kramer, D.W. Datlow, R.M. Huffman, L.P. Appel, M.A. Herman, N.T. Connaughton, J.C. Perkins, H.J. Alpert, S.R. Rishi, I. Spector, D. Ramaswamy, D.F. Miller, N.A. Crane, N.S. Otchin, B. Choi, N. Mendjuk, P.S. Spiegler, V.T. Miller, I.V. Magal, W.D. Lassek, J.M. McGinnis, N.E.S. Falk, T.C. Havell II, R. Kavalier, M.G. Mukhopadhyay, J. Taubin, B.P. Tinker, A.L.B. Williams, M.J. Fliegelman, N. Gonzalez, B.E. Lessin, S.K. Irani, B.A. Lowen, B.A. Meyers, M. Mohamadi, A.A. Nimetz, R.J. Osheroff, A.S. Lai, E. Rodriguez, V.E. Hanes

Special Lecturers S. Katz, D.S. Frederickson, B.W. Janicki, R.P. Brouillard

303 Computers in Clinical Cardiology Rios, Ros

Emphasis on development of computer programs applicable to clinical cardiology. Students given opportunity to develop original applications programs or to interact with staff in programming and validation of automated systems for the analysis of intracardiac electrocardiography, non-invasive cardiological techniques, exercise electrocardiography, etc. Basic knowledge of FORTRAN needed. Personal interview required. Limited to two students. 4- or 6-week elective periods. Univ. Hosp.

***305 Inpatient Clerkship** Staff

Training in comprehensive study of patients; history and physical examination; ward rounds, consultations, conferences, preceptorial teaching, seminars. V.A., Univ. hosps., and Wash. Hosp. Center (12-week periods throughout academic year)

***308 Outpatient Medicine and Emergency Room** Staff

Care of ambulatory patients and emergency cases under close supervision. Daily clinics in general medicine and various specialties; conferences on current cases. Univ. Clinic and Hosp. Emergency Room (8-week periods throughout the academic year)

324 Immunology Perlman

Clinical, laboratory, and research aspects of immunology. Readings for weekly seminar; emphasis on basic immunological techniques and the immunological basis of appropriate disease entities. Opportunity for independent, supervised research. 8-week elective periods. Permission of instructor required. Univ. Clinic

330 Advanced Interviewing and Physical Diagnosis Lewis

(Formerly Advanced History and Physical Analysis)

Students function as interns; emphasis on the true merit of the case history and physical examination versus diagnosis by laboratory data. 8-week elective periods.

332 Acting Intern in Medicine Arling

Student is assigned to a patient-care team by the Medical Chief Resident. Under supervision of ward resident and attending physician, the student assumes an intern's responsibility for completing initial patient evaluation, data base, writing medical orders, (which must be cosigned by an M.D.), coordinating patient's care, writing progress notes, and dictating the discharge summary. Average patient load is six, allowing student sufficient time to study patient problems as well as to attend Medical Service conferences. Since acting interns assume primary patient responsibility, they

* Required for medical students.

cannot leave their teams for vacations or internship interviews. Group matches with Med 333 and 334. Univ. Clinic

333 Acting Intern in Medicine — **Curtin**

Student works with a patient-care team on a medical ward, does initial evaluation and presents patient's problem at attending rounds and at appropriate teaching conferences, under the supervision of the medical resident and the attending physician. Subspecialty consultations also review patient's problem with the student. 4- or 8-week elective periods. Wash. Hosp. Center

334 Acting Intern in Medicine — **Zimmerman**

Student assigned to a patient-care team under direct supervision of a University resident on general medical wards. Problem Oriented Medical Record System used. Students complete initial patient evaluation data base and are responsible for patient management during hospitalization. Students write all orders, which must be reviewed and cosigned by the resident. Students are expected to present their patients at attending rounds and conferences. Close supervision and guidance by the team resident and attending physician will be enhanced by subspecialty consultants. Interview required. 4- or 8-week elective periods. V.A. Hosp.

336 Acting Intern in Intensive Care Medicine — **Curtin**

Student works on intensive care unit. 4- or 8-week elective periods. Wash. Hosp. Center

350 Clinical Infectious Diseases — **Parker**

Fundamental concepts in the diagnosis and treatment of bacterial, viral, fungal, and mycobacterial infections. Students take primary responsibility in seeing consultations; familiarization with advantages and limitations of laboratory techniques used to diagnose and manage infectious disease problems. Review of consultations seen by students by resident and full-time faculty members. Introduction to hospital infection surveillance program. 4- or 12-week elective periods. V.A. Hosp.

351 Clinical Infectious Diseases — **Sheagren, Tuazon**

Clinically relevant aspects of microbiology and immunology; relevant aspects of patient history, physical and laboratory examinations. Students will learn to do quality infectious disease consultations and how to use antibiotics intelligently. Minimum 4-week clinical rotation. Students electing a longer time period will assist with research project in infections in drug abusers, staphylococcal infections (especially endocarditis), clinical pharmacology of gentamicin or mechanisms of immunity in sickle cell anemia patients. Two students may elect the clinical rotation.

352 Clinical Cardiology — **Hsu and Staff**

Experience in ambulatory and hospitalized patient care: ECGs, graphics, CCU, exercise laboratory; observation in catheterization laboratory and participation in hypertensive research clinic. 8-week elective period. Univ. Clinic

353 Clinical Cardiology — **Manchester**

Observation of and participation in the diagnosis and clinical management of cardiovascular disorders. Acquaintance with physical signs of heart disease. Exposure to noninvasive diagnostic procedures, echo-, phono-, apexcardiography; interpretation of electrocardiograms and chest X-rays; ward rounds in intensive coronary care unit. 8-week elective periods.

358 Clinical Cardiology — Bacos, Mendelson, Marsh, Obole

Bedside evaluation is emphasized and correlated with special diagnostic studies, including stress testing, phono-cardiography, echo-cardiography, cardiac catheterization, angiography, etc. 4-week elective periods. Wash. Hosp. Center

359 Coronary Care Unit — Bacos, Mendelson, Marsh, Obole

Participation in patient care. Students work closely with house staff and attending staff. Emphasis on diagnosis and treatment of coronary disease, complications of infarction, diagnosis and treatment of arrhythmias, and selection of patients for surgical intervention. 4-week elective periods. Wash. Hosp. Center

360 Clinical Cardiology — Fletcher*

Experience in clinical cardiovascular problems under supervision of cardiology staff. Emphasis on history, physical diagnosis, and noninvasive cardiovascular techniques. Role of cardiac catheterization explained and results in specific cases discussed. Electrocardiography covered as one of the tools used to approach the cardiovascular patient. Patient management is integral part of course. Teaching rounds and conferences. 4- or 8-week elective periods. V.A. Hosp.

363 Cardiac and Medical Intensive Care — Saunders†

Students take call every third night with a resident/intern team. Participation in all aspects of coronary care and familiarization with special unit techniques such as cardioversion, pacemakers, Swanz-Ganz catheters, intra-aortic balloon counterpulsation and mechanical ventilators. Opportunity for supervised management of a spectrum of other critical illnesses. 4-week elective periods. V.A. Hosp.

364 Cardiovascular Data Processing — Pipberger

Study of a variety of modern computer techniques; primary research in computer analysis of electrocardiograms. 4- or 8-week elective periods. V.A. Hosp.

365 Clinical Electrocardiography and ECG Computer Analysis — Pipberger

Participation in daily computer processing and analysis of all electrocardiograms from two V.A. hospitals and Children's Hospital, D.C. ECG findings correlated with clinical data from all problem cases. Daily review sessions with Section Chief and cardiac fellows. Participation in weekly seminars and a Journal Club. 4- or 8-week elective periods. V.A. Hosp.

371 Endocrinology — Gaskin

Student evaluates patients referred to the endocrinology service, takes part in planning diagnostic work-ups or therapy programs, and is responsible for case presentations of patients he has worked up. Exposure to techniques used in the endocrinology laboratory, such as protein binding determinations and radio-immuno assay of hormones; participation in Journal Club two mornings a week and in weekly conferences. The student is expected to assume prime responsibility for directing patient evaluations. 4-week elective periods. Wash. Hosp. Center

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* Dr. Fletcher is Chief of Cardiology at the Veterans Administration Hospital.

† Dr. Saunders is Chief of Medicine for Intensive Care at the Veterans Administration Hospital.

373 **Endocrinology and Metabolism** — Becker

Clinical experience in endocrinology and metabolism. Students examine endocrine patients, make preliminary diagnoses, and assist in treatment. Clinical rounds daily; weekly endocrine clinic, diabetic clinic, and Journal Club participation; laboratory and research experience available. 4- to 12-week elective periods. V.A. and Univ. hosps.

375 **Endocrinology Research** — Becker and Staff

Participation in endocrinology and metabolism research laboratory. Introduction to chemical and technical aspects of endocrine research. Participation in ongoing research activities. Students learn appropriate procedures, such as radioimmunoassay of hormones, histopathologic technics, atomic absorption spectrophotometry, and investigative approach to solving research problems. Prior interview with instructor suggested. 8-week elective periods. V.A. Hosp.

376 **Metabolic Disorders in Diabetes** — Penhos

Intensive and practical studies of the technique to produce surgical, chemical, and hormonal diabetes. Participation in research on carbohydrate, protein, and lipid metabolism, insulin secretion in isolated organ perfusions. Seminars and participation in Journal Club; discussions on the results obtained. 4-week elective periods. V.A. Hosp.

381 **Research in Endocrinology** — Penhos

Participation in endocrine research, including laboratory experience, experimental surgery, biochemical methods, and *in vivo* and *in vitro* endocrine studies. Weekly seminars and discussions correlate experimental results with clinical observations. 4-week elective periods. V.A. Hosp.

385 **Biochemical Abnormalities in Disorders of Lipoprotein Metabolism** — LaRosa

Current research directed toward the biochemical purification of enzymes responsible for removing lipids from the plasma and a study of the possible relationship between induction of these enzymes and the progestional and estrogenic components of currently used birth control pills. Experience in the use of modern techniques of protein separation, including ultracentrifugation, electrophoresis, and chromatography; experience in handling radioactive isotopes. Clinical experience with patients who have hyperlipoproteinemia. 12-week elective periods. Nat'l. Heart and Lung Institute, NIH, and Univ. Hosp.

387 **Diabetes Research Laboratory** — Recant*

Research oriented toward the patient with diabetes mellitus. Studies in humans, laboratory animals, isolated perfused organs, and isolated tissue *in vitro*. Diagnostic studies for hypoglycemia and hyperglycemia. Consultations and rounds on patients with problems in carbohydrate or lipid metabolism. Weekly conferences. 12-week elective periods. V.A. Hosp.

390 **Extramural Internal Medicine Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

*Dr. Recant is Chief of the Diabetes Research Laboratory at the Veterans Administration Hospital.

391 **Clinical Oncology** Col

Participation in clinical management of patients with carcinoma on medical oncology ward. 8- or 12-week elective periods. V.A. Hosp.

393 **Medical Oncology** You

Experience in current methods in evaluation and treatment of lymphom chronic leukemias, ovarian, breast, and other malignancies, including view of the broad spectrum of these diseases. Participation in pati care and laboratory studies of current research in clinical pharmacolo tumor kinetics, and *in vitro* marrow culture techniques. Prerequisite: P mission of instructor. 8-week elective periods. Nat'l. Cancer Institu NIH

396 **Clinical Pharmacology** Wi

Introduction to clinical pharmacology and toxicology as the basis of regulatory work of the Food and Drug Administration. Collaborati with a team of scientists dealing with the review of investigational ne drug applications and new drug applications, with a drug experience re porting system, and with annual reviews of drugs in specific areas, empha sizing study of the benefit/risk ratio. Project work in a toxicology labora tory. Interview required. 12-week elective periods. Bureau of Drug FDA

397 **Clinical Pharmacology of New Antineoplastic Agents** Creav

Study in the medical oncology section; emphasis on clinical therapeu and the use of biochemical or other methodology for the determinatio of drug uptake, metabolism, excretion, and assay of marker substances a indicators for tumor response. 8- or 12-week elective periods. V.A. Hos

402 **Research in Cancer Immunology** Hollinshe

Laboratory experience with tests used to correlate cellular anti-tumor i activity to solid tumors with the clinical course of the disease; experimen to investigate viral etiology of certain forms of cancer; study of fetal an gens and role in oncogenesis; cell membrane antigens specific for leukem 1 senior; 8-week elective periods. Ross Hall

403 **Research in Cancer Immunology** Perim

Emphasis on attaining a background in the advancements of the last 3 years which have led to immunodiagnostic and immunotherapeutic tech niques for cancer. Further research opportunities available. Weekl seminars. Permission of instructor required. 8-week elective periods.

412 **Clinical Gastroenterology** Danis

Work in a suburban office devoted to private partnership practice of in ternal medicine with emphasis on gastroenterology. Hospital rounds, eva uation of problems, discussion with attending physician and/or patient terms of diagnosis and therapy, observation of and assistance in specialize procedures, practical aspects of office management. 4- or 8-week elective periods.

413 **Clinical Gastroenterology-Hepatology** Dobbins, Ginsberg, Stas

Intensive clinical experience with patients who have digestive disease, in cluding those of the gastrointestinal tract, liver, and pancreas. Patien

consultations, teaching rounds, seminars. Joint conferences with surgery, pathology, and radiology emphasize the multidisciplinary approach in digestive diseases. 4- or 8-week elective periods. Univ. Clinic

414 **Clinical Gastroenterology-Hepatology** — Finkelstein

Students see patients referred to the gastroenterology-hepatology section for consultation and are responsible for initial evaluation and the follow-up of these patients. Participation in all specialized procedures including various biopsy techniques and endoscopies. Teaching rounds, conferences, seminars. Student may elect to concentrate in either gastroenterology or hepatology. 4- or 8-week elective periods. V.A. Hosp.

423 **Clinical Gastroenterology** — Trujillo

Introduction to clinical problems in diagnosis and treatment of gastroenterology in both office and hospital practice. Peritoneoscopy, endoscopy, and biopsies. 4-week elective periods. Univ. Hosp.

424 **Morphology of the Liver and Intestines** — Dobbins

Research designed to acquaint the student with a variety of morphologic techniques used in the study of mucosal disease of the gastrointestinal tract. Includes electron microscopy and light microscopy techniques—phase and fluorescent microscopy. Preference given to student able to continue on a part-time basis following completion of the elective. 8-week elective periods. Univ. Clinic

426 **Research in Metabolism of Sulphur Amino Acids** — Finkelstein

Study of methionine metabolism in mammalian tissues using several research techniques: kinetic properties of purified enzymes; induction and repression of enzymes by hormones and diet; metabolism of methionine in the isolated perfused rat liver. Projects available in any of the above areas and will be developed further to meet student needs. 12-week elective periods. V.A. Hosp.

430 **Clinical Hematology** — Schechter*

Study of the methods for evaluation and treatment of patients with hematological disorders. Ward rounds, morphology review sessions, participation in hematology clinic and Journal Club. 4-week elective periods. V.A. Hosp.

431 **Clinical Hematology and Oncology** — Lessin and Staff

Participation in the diagnosis and therapy of hematologic and oncologic disorders, including inpatient and outpatient consultations, daily care, and follow-up of clinical hematologic problems. Emphasis on acquainting the student with modern hematologic diagnostic procedures and current literature. 4- or 8-week elective periods. Univ. Hosp. and Clinic

432 **Clinical Hematology** — Pierce

Clinical evaluation of inpatients and outpatients with symptoms referrable to the myelopoietic system using bedside and laboratory investigative parameters. 4-week elective periods. Wash. Hosp. Center

433 **Hematology** — Rheingold

Observation of and participation in diagnosis and treatment of patients with hematologic disorders. 4-week elective periods. Physician's office.

*Dr. Schechter is chief of the Hematology Section at the Veterans Administration Hospital.

435 Hematology Research — Lessin and S

Participation in the hematology research laboratory. Emphasis on
velopment of the student's own project related to dynamic morpho
of the blood cells, blood cell ultrastructure, and electron micros
techniques. Introduction to red cell rheology and physiology. 8-
elective periods. Univ. Hosp.

436 Hematology Research — Schech

The main research deals with lymphocyte and plasma cell biology
particular blastogenesis, macrophage interactions. Facilities available
do *in vitro* production culture of human peripheral blood and bone m
row, radioisotopic studies and electron microscopy. 8- or 12-week elec
periods. V.A. Hosp.

437 Blood Transfusion in Clinical Practice — Green

Demonstration and discussion of the preparation, properties, and clini
use of all blood components and of the basic genetics and immunol
of the blood groups and allotypes. Opportunity to perform bench wo
in resolving immunologic transfusion problems. 4-week elective perio

440 Pulmonary Medicine — Sp

Introduction to the diagnosis and treatment of diseases of the lung; exp
ence in the management of patients with acute respiratory failure. Pa
ticipation in daily ward rounds with a full-time faculty member and
weekly pulmonary grand rounds and the lung seminar series. Work-up
patients with various pulmonary disorders, including pulmonary func
testing, arterial blood gas studies, exercise studies, and other techniqu
4- or 8-week elective periods. V.A. Hosp.

442 Pulmonary Diseases — Witor

Performance and interpretation of pulmonary function studies, includi
ventilatory, diffusing capacity, and blood gas analysis; daily teachi
rounds and supervised consultation on patients with various pulmona
and infectious diseases. Participation in pulmonary clinic; techniques a
principles of inhalation therapy. Principles of and experience with re
spiratory failure and respiratory intensive care. 4-week elective period
Wash. Hosp. Center

447 Research in Pulmonary Diseases — Sto

Detailed studies of the synthesis and regulation of lung surfactant, mech
anisms of airways obstruction, or immunological aspects of lung disease
12-week elective periods. V.A. Hosp.

449 Primary Care Elective — Arbu

Students assigned to European-trained family practitioner in small town
on a Bahaman out island. Caring for patients with medical, surgical,
pediatric, obstetrical-gynecological, psychiatric and tropical disease prob
lems. Students responsible for their own transportation. Housing mu
be provided. 4- to 8-week rotations. Open to two students.

451 Arthritis and Rheumatic Diseases — Fel

Introduction to clinical problems in the diagnosis and treatment of arthriti
and rheumatic diseases. Emphasis on patient evaluation and establishme
of therapeutic priorities. 4-week elective periods. Univ. Clinic

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* Dr. Schechter is chief of the Hematology Section at the Veterans Administration Hospital.

452 **Clinical Rheumatology** — **Alepa***

Active participation in work-up and management of inpatients and clinic patients with rheumatic diseases. History, physical examination, differential diagnosis, immunological mechanism, X-ray reading, and use of laboratory tests are stressed. Laboratory facilities available with emphasis on immunology. 4-week elective periods. V.A. Hosp.

453 **Introduction to Arthritis** — **Barth**

Work-up, rounds, clinic, and consultations on patients with arthritis and rheumatic diseases. Daily discussions on selected topics in rheumatology, including clinical immunology, major disease categories (SLE, RA, gout, etc.); differential diagnosis, drug therapy, serological reactions, X-ray changes. 4-week elective periods. Wash. Hosp. Center

454 **Total Patient Care** — **Tamagna**

Participation in total patient care program, including medical rehabilitation and group evaluation conferences. 4-week elective periods. Univ. Hosp.

455 **Physical Medicine and Rehabilitation** — **Chiu, Mourad, Enders**

Participation in all activities in inpatient and outpatient diagnosis, treatment, consultation, and EMG. 4-week elective periods. Univ. Hosp.

460 **Renal and Electrolyte Disorders** — **Berkman**

Participation in consultations on renal and electrolyte abnormalities; follow-up of patients. Examination of urinary sediment and exposure to peritoneal dialysis, hemodialysis, renal biopsy and transplantation. Conferences, reading assignments, ward rounds, participation in Journal Club. 4-week elective periods. Wash. Hosp. Center

461 **Clinical Renal Disease** — **Parrish, N. Kramer, Guha**

Participation in clinical and laboratory procedures used in the study of renal disease. Ward rounds, consultations, conferences, seminars. 4-week elective periods. Univ. Hosp.

463 **Clinical Application of Tissue Immunology** — **N. Kramer**

Application of immunologic methods to the study of human hypersensitivity states and metabolic diseases; study of serum proteins, including protein hormones and enzymes; research principles and methods; tissue typing and flourescent antibody methods. 4-week elective periods. Univ. Hosp.

465 **Renal Diseases and Fluid and Electrolyte Problems** — **Jacobson**

Participation in office and hospital consultations; care of patients with renal diseases and fluid and electrolyte problems. Student becomes familiar with a variety of renal problems; works up patients with renal disease; evaluates renal function studies. Emphasis on critical use of medical literature. One student. 4- or 8-week elective periods.

* Dr. Alepa is Chief of the Rheumatology Section at the Veterans Administration Hospital.

469 Clinical Renal Disease — Shalh

Broad exposure to and active participation in all the clinical activiti the renal section, including consultations, hemodialysis, outpatient cl rounds, conferences, and Journal Club meetings. 4- or 8-week elec periods. Time period must first be cleared through instructor's office. Hosp.

470 Allergy Clinic — Ratcliffe, W

Lectures, conferences and attendance at allergy clinic where patients varied allergic problems are seen. Detailed history-taking, physical e nation and special skin-testing techniques, laboratory procedures. Dis sion of each case with an allergist and development of complete mana ment program. 4-week elective period. Univ. Clinic

471 Allergy Clinic — Ward, E

Same as Med 470. 4-week elective period. Walter Reed Hosp.

472 Private Office Practice of Allergy

4-week elective period.

473 Extramural Allergy Elective

The department arranges for students to spend elective periods at institutions. Interested students should contact the chairman of the partment.

474 Private Office Practice of Allergy — Sel

4-week elective period.

483 Nuclear Medicine — Sauerbrun

Introduction to radioisotope methodology as applied to diagnostic or ther peutic problems in medicine. Study of the unique properties of radioactiv ity, radiation safety, and instrumental uses in the detection of radiated Evaluation of patients referred for diagnostic and therapeutic studie Student may choose a selected field of interest for more intensive study and may engage in limited participation in on-going clinical research pro ects. 12-week elective periods. V.A. Hosp.

485 Biochemical Endocrinology — Sty

Student develops research project or participates in ongoing research pro ect. Emphasis on experimental design and techniques used in solving modern medical problems. One senior (any time). Permission of instruc tor required. 12-week elective periods. (September through Ma NIH

495 Oncology Review — Hollinshea

Each student assigned a carefully selected reading list on one form of can cer. Fundamentals, basic research, and latest clinical approaches discussed in detail. Student will write and illustrate a review of his or her subject. Interested students encouraged to undertake their own research projects the following summer. 4-week elective period.

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* Dr. Shalhoub is Chief of the Renal Section at the Veterans Administration Hospital.
† Dr. Sauerbrunn is Chief of Nuclear Medicine at the Veterans Administration Hospital.

hairman: L.F. Affronti

rofessors M.L. Robbins, R. Hugh, E.M. Lerner II *(Research)*, L.F. Affronti
rofessorial Lecturer D.H. Heilman *(Cellular Immunology)*
ociate Professors M. Reich, K. Huang, P.D. Kind, C.R. Hartman
sistant Professors Y. Chu, R.F. De Giovanni-Donnelly *(Research)*, M.R. Loeb *(Research)*

106 **Environmental Science of Nosocomial Infection** (1) **Staff**
Developing a surveillance protocol for nosocomial infection. Microbiological assay of the animate and inanimate components of the hospital environment. (Spring)

128 **Microbiology for New Health Practitioners** (2) **Staff**
Lecture course. Basic concepts in microbiology. Topics include structure and morphology of microbial cell and micro-organisms of medical importance in wound infections and in localized infections of the respiratory tract. (Fall and spring)

151 **Public Health Microbiology I** (3) **Staff**
Medical parasitology, protozoology (intestinal), the Haemosporidia (malaria), the Haemoflagellates and the metazoa (helminths) of medical importance. (Spring)

152 **Public Health Microbiology II** (2) **Staff**
Clinical bacteriology, characteristics and identification of the bacteria involved in disease, study of rickettsia and viruses. (Spring)

153 **Public Health Microbiology III** (2) **Staff**
Study and identification of the flora of water, dairy products, food, and the atmosphere. (Spring)

154 **Public Health Microbiology IV** (1) **Staff**
Mycology: study of medically important fungi, systematic mycoses and dermatomycoses. (Spring)

*201 **Medical Microbiology** (8) **Staff**
(Formerly six credits)
For medical students; open to qualified graduate students by special permission. Bacteria, rickettsiae, viruses, yeasts, molds, protozoa, metazoa which relate to the health and disease of man—cultural studies, methods of diagnoses, theories. Laboratory fee for nonmedical students, $16. (Spring)

211 **Microbiology** (4) **Staff**
Bacterial viruses, rickettsiae, fungi, parasites and immunological concepts. Prerequisite or concurrent registration: Bioc 221–22, or other biochemistry course, and permission of instructor. Laboratory fee, $20. (Fall)

*equired for medical students.

212 Pathogenic Microbiology (4) Staf

For graduate students. Continuation of Micr 211; emphasis on pathogen activities of microorganisms. Prerequisite: Micr 211. Laboratory fe $16. (Spring)

214 Tissue Cell Culture and Somatic Variation (4) Ch

Techniques of tissue culture and means of studying somatic variation Prerequisite: Micr 211 or equivalent. (Spring)

215 Medical Parasitology (1 or 2) Staf

For graduate students; open to medical students. Study of host-parasite relationships. Clinical recognition of important parasites in medicine (Fall)

219–20 Scientific Writing for Graduate Students (1–1) Robbins

Required of all graduate students prior to writing a thesis or dissertation Some research experience required. (Academic year)

223 Antimicrobial Chemotherapy Affronti, Reich

For medical students. Lecture course. Selection, clinical applications, and mechanism of action of various drugs and antibiotics used in the treatment of microbial infections. Members of the clinical faculty discuss relevant aspects of clinical chemotherapy. Prerequisite: Micr 201. (Fall)

225 Microbial Physiology I (3) Reich, Affronti

Morphology and biochemistry of various microorganisms with emphasis on bacteria. Prerequisite: Bioc 201 or 221–22; Micr 211 or equivalent (Fall)

226 Microbial Physiology II (3) Reich, Affronti

Effects of physical and chemical agents on microorganisms with emphasis on antibiotics. Prerequisite: Micr 225 or permission of instructor. (Spring)

229 Immunology (3) Kind, Affronti

Lecture course. Fundamental immunologic concepts. Lectures will cover antigens, antibodies, antigen-antibody reactions *in vitro* and *in vivo*, and the immune response. Prerequisite: Micr 211 or permission of instructor

230 Immunology Laboratory (2) Kind, Affronti

Serologic and immunologic procedures as applied to clinical and research situations emphasized. Prerequisite or concurrent registration: Micr 229 or permission of instructor. Laboratory fee, $16. (Fall, odd years)

231 Immunobiology (1) Affronti, Kind

Lecture course. Study of immunological functions of reticulo-endothelial tissues, theories of autoimmunity, graft rejection, tumor immunity, delayed hypersensitivities, and immunogenetics. Members of the clinical faculty discuss relevant aspects of immunobiology. For medical students, open to graduate students by permission of instructor.

233 Biology of Viruses (2) Robbins, Huang

Biochemical and genetic characterization of viruses. Prerequisite: Micr 211 or equivalent. (Fall)

234 **Biology of Virsuses—Laboratory** (2) Robbins, Huang

Laboratory complement to Micr 233. Prerequisite or concurrent registration: Micr 233. Laboratory fee for nonmedical students, $20. (Fall)

235 **Systematic Bacteriology** (2) Hugh

History of bacterial classification, international rules of nomenclature as applied to bacteria, development of bacterial classification based on relationships, survey of characteristics of bacterial groups. Prerequisite: Micr 201 or 212; or equivalent. (Fall, odd years)

*241–42 **Biomedical Instrumentation** (4–4) Staff

Same as Bioc 225–26, ForS 281–82, and Phys 223–24. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification, and quantification of materials of interest to biomedical and forensic scientists. Laboratory fee, $50. (Academic year)

251 **Clinical Laboratory Bacteriology** (3) Hugh

For graduate students; open to medical students. Detection and identification of bacterial agents which cause diseases in man. Comparative isolation and identification methods; emphasis on interpretation and significance of laboratory observations. Prerequisite: Micr 201 or equivalent. (Fall, even years)

252 **Medical Protozoology** (1) Staff

For medical students; open to graduate students. Lecture and laboratory course. Clinical recognition of important protozoal parasites in medicine. Disease, its pathology, symptomatology, diagnosis, treatment and prevention. (Fall)

253 **Medical Helminthology** (1) Staff

For medical students; open to graduate students. Lecture and laboratory course. Clinical recognition of important parasitic worms in medicine. Disease, its pathology, symptomatology, diagnosis, treatment and prevention. (Fall)

254 **Malariology** (1) Staff

For medical students; open to graduate students. Lecture and laboratory course. Clinical, laboratory and epidemiological factors in malarial diseases in humans. Pathogenesis, symptomatology, clinical and laboratory diagnosis. (Fall)

255 **Virology** (1) Huang

Primarily elective course for medical students; open to graduate students. General principles of virology; emphasis on clinical situations. Prerequisite: Micr 201 or equivalent. (Fall)

257 **Experimental Immunochemistry** (3) Affronti

Biochemical and physiochemical characterization of antigens and antibodies. Prerequisite: Bioc 221–22 or equivalent, Micr 229. Laboratory fee for nonmedical students, $20. Limited enrollment. (Spring, even years)

* An interdisciplinary course offered by the departments of biochemistry, forensic sciences, microbiology and physiology.

258 **Microbial Genetics** (2) De Giovanni-Donne
Survey of microbial systems that depict basic concepts of genetic prin ples. Prerequisite: Micr 211 or equivalent. (Spring)

260 **Cellular Immunology** (1) K
Advanced seminars in cellular aspects of the immune response. P requisite: Micr 229.

277–78 **Seminar: Microbiology** (1–1) St
Required of graduate students. (Academic year)

280 **Virology** Huang, Robb
Selected problems; library assignments, laboratory studies. 8-week electi periods.

281 **Biological Basis of Infections** Affronti, Re
Selected problems; library assignments, laboratory studies, term paper. 4 week elective periods.

282 **Immunology** K
Selected problems, library assignments, laboratory research. 4-week ele tive periods.

283 **Bacteriology** Hug
Selected problems; library assignments, laboratory studies, term paper. 4 week elective periods.

284 **Microbial Genetics** De Giovanni-Donn
Selected problems, library assignments, laboratory studies, term paper. 4 week elective periods.

285 ***In vitro* Study of Immune Responses** Ch
Preparation of specific antigens from a cell strain and production of anti bodies against this strain in appropriate mammalian host; identification o unknown cell types using tissue culture, serology, immunochemistry. 4 week elective periods.

289 **Inflammation, Immunity, and Hypersensitivity** Affronti and Staf
4-week elective periods.

290 **Extramural Microbiology Elective** (arr.)
The Department arranges for medical students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

293 **Special Topics in Microbiology** (arr.) Staff
Selected topics in microbiology. May be repeated for credit. (Fall and spring)

295 **Research in Microbiology** (arr.) Staff
Content differs each time the course is offered; may be repeated for credit (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.) **Staff**
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Neurological Surgery

Chairman: H.V. Rizzoli

Professors H.V. Rizzoli, T.H. Milhorat
Clinical Professors J.M. Williams, H.H. Ammerman, G. Di Chiro, G.J. Hayes, J.M. Van Buren, N.H. Horwitz, C.L. Li, A.K. Ommaya
Professorial Lecturer K.M. Earle
Associate Professors C.B. Early, D.R. Smith, G.J. Mathews
Associate Clinical Professors J.P. Murphy, A.N. Martins, W.T. Koos, A.P. Hustead
Assistant Clinical Professors F.D. Cooney, J.W. Barrett, C.P.H. Carroll
Instructor A.I. Kobrine
Clinical Instructors R.A. Mendelsohn, J. Kushner, M.W. Dennis, M.K. Hammock, S. Koulouris, E.B. Byrd, K. Ghaemi, B. Stopak

302 **Clinical Clerkship in Neurosurgery** **Staff**
2-week elective periods. Univ. Hosp.

380 **Clinical Neurosurgery** **Staff**
Clinical clerkship in neurosurgical service. Emphasis on neurologic examination; indications for special neurologic tests, e.g., arteriograms, pneumoencephalograms, etc.; and operative procedures. 4-week elective periods. Univ. Clinic

381 **Clinical Neurosurgery** **Martins**
Participation in all departmental activities: ward rounds, daily conferences, radiographic and pathologic studies, operating room procedures; emphasis on studies of cerebral circulation. 4-week elective periods. Walter Reed Gen. Hosp.

382 **Clinical Neurosurgery** **Early**
Participation in all departmental activities; ward rounds, daily conferences, radiographic and pathologic studies, operating room procedures. 4-week elective periods. Nat'l. Naval Med. Center

383 **Pediatric Neurosurgery** **Milhorat**
Participation in all departmental activities; ward rounds, daily conferences, radiographic and pathologic studies, operating room procedures. 4-week elective periods. Children's Hosp.

385 **Clinical Neurosurgery** Mathe

Clinical clerkship includes experience with diagnostic procedures: arte grams, pneumoencephalograms, myelograms, and assisting in opera room; conferences and ward rounds. 4-week elective periods. V.A. Ho

387 **Clinical Neurosurgery** St

Participation in all departmental activities, including ward rounds, cl conferences, radiographic and pathologic studies, and operating room pr cedures. 4-week elective periods. Wash. Hosp. Center

390 **Extramural Neurosurgery Elective** (arr.)

The department arranges for students to spend elective periods in oth institutions. Interested students should contact the Chairman of the De partment.

Neurology

Chairman: G.F. Molinari
Director of Encephalographic Laboratory: A. Racy

Professors H. Stevens, S. O'Reilly, H.H. Hess, D.O. Davis, G.F. Molinari
Clinical Professor W.K. Engel
Professorial Lecturers K.M. Earle, N.P. Goldstein
Associate Professor A.B. Barnet
Associate Clinical Professors A.S. Dekaban, A. Stazio, N. Myrianthopoulos K.B. Nelson, K. Abraham, C. Ajmone-Marsan, A.J. Levens, D.J. Fishm
Assistant Professors M.M. Platt, A. Racy
Assistant Clinical Professors V. Duggins, A.D. Huott, W.J. Hawes, M.M. Davis W.E. Lightfoote II
Clinical Instructors M.C. Korengold, E.C. Wilner, H. Silby, D. Satinsky, R.N Edelson, V.J. Blazina, M.P. Duncombe, M. Osborne, H.T. Vollero

380 **Clinical Neurology** Molinari and Staf

Clinical clerkship in neurology. Emphasis on neurologic examination; in dications for special neurologic tests, e.g., arteriograms, pneumoencephalo grams. 4-week elective periods. Univ. Hosp.

382 **Pediatric Neurology** Platt and Staf

Clinical clerkship in diagnostic study and care of inpatients and outpa tients; conferences and teaching sessions. 4-week elective periods. Chil dren's Hosp.

383 **Clinical Neurology** Buchanan

Emphasis on neurological examination and basic sciences, including neuro anatomy, as applied to clinical material. 4-week elective periods. Walte Reed Gen. Hosp.

386 **Clinical Neurology** Goldstein

Clinical clerkship under close supervision of highly experienced clinicians and teachers. Trainees prepare histories and conduct physicals, attend rounds and conferences, assist in routine procedures. Abundant clinical material available. 8-week elective periods. Mayo Clinic

390 **Extramural Neurology Elective** (arr.)

A student electing a clerkship at the University Hospital can spend a further elective period in another institution. The student arranges the elective with the other institution and brings the letter of acceptance to the chairman of the department of neurology for approval. The student is responsible for reporting the grade received to the department of neurology, which in turn will submit it to the Associate Dean for Curricular and Student Affairs.

Obstetrics and Gynecology

Chairman: A.B. Weingold

Professors R.H. Barter, J.G. Sites, S.E. Fabro, A.B. Weingold, R. Hertz *(Research)*, J.G. Maier, L. McGowan, R.A. Chez

Clinical Professors W.P. McKelway, M.P. Footer, W.H. Cooper, O.I. Dodek, Jr., H.L. Kotz, J.W. Pearson, Jr.

Associate Professors B. Waxman, J.B. Craft, Jr., S. Marinoff, C.B. Jacobson

Associate Clinical Professors W.T. Lady, S.S. Martin, D. Walters, J.M. Friedman, P. Soyster, T.A. Wilson, J.C. Walsh, L.M. Liverett, N.J. Price, H.A. Donald, M.S. Burnhill, S.M. Belinsky, E.A. Crisp, C.R.A. Gilbert, L. Goldstein, J. Grodin, M. Rosenbaum

Assistant Professors J.C. Srabstein, R.J. Falk, J.L. Marlow, J.W. Larsen, Jr.

Assistant Clinical Professors J.R. Epstein, S.H. Shea, H.P. Treichler, I.W. Rovner, M.W. Sandmeyer, Jr., N.M. Tart, G. Speck, A.W. Winshel, R.V. Erkenbeck, L.Q. Pugsley, J. Fogel, A.I. Robins, S.F. Stewart, Jr., W.F. Peterson, C.D. Crystle, G.R. Hewlett, C.E. Townsend, M.L. Cole *(Nurse Midwifery)*, A.A. Becker, J.M. Close, S.D. Cooley, C.L. Campbell, J.B. Credle, L.E. Fettig, E.E. Gahres, R.S. Guy, D.H. Martin, G.K. Oakes, G.W. Paul, L.C. Radice, M. Savarese, J.D. Schulman, E.W. Titus, Jr., W.D. Wallace, V.B. Hugh

Instructors B. Bunnag *(Research—Cytology)*, J.D. Berryman, A. Razi

Clinical Instructors A.S. Bright, D.R. Carlson, E.E. Cunningham, J. Sacks, R.E. Badwey, T.H. Gresinger, E.R. Kolvereid, D.M. Margulies, J.C. Skilling, R.W. Smith, R.M. Regan, B.A. Band, W.R. Perkins, J.E. Anderson, A.A de Moya, D.C. Meek, C.D. Lord, H.C. Beaver, D. Davoudlarian, M. Fialco, S.T. Lee, R.J. Pierce, C.I. Schneiderman, J.E. Alarcon, A.A. Greenfield, T.A. Cook, Jr., M.J. Roberts, N.A. Carr, G.M. Kioko, R.C. Rigor, S. Shinde, E.G. Koch, A.M.L. Van Rooy, F.A. Akerele, J.W. Lyles, J. Pan, J.J. Kuhn,

K. Bis, S.P. Gardner, J. Izanec, S.R. Johnson, A.M. Lazarus, R.S. Margol
C.A. Olds, R.J. Orleans, D.S. Chuzi, V.L. Crandall, E.B.Q. Culberson

Special Lecturers R.J. Clark, S.C. Booker, J.H. Niles, L. Burnhill, J.B. Sheffe

*303 **Clinical Obstetrics and Gynecology** Sta

Participation in all obstetrical and gynecological clinics, daily departmen conferences and ward rounds at University, Fairfax, and Columbia hosp tals. Manikin demonstrations of mechanism of labor and various types operative delivery. (8-week periods throughout academic year)

351 **Introduction to Clinical Practice** Jacobso

Introduction of first-year medical students to patient situations by mem bers of the clinical staff. Designed to stimulate questions and discussion regarding physical, financial, and moral implications of medical practic Open to 25 students. Univ. Hosp. (Spring)

375 **Clinical Obstetrics and Gynecology and Family Planning** Weingold, Waxman McGowa

Participation in office practice of obstetrics and gynecology and famil planning clinic. 4-week elective periods. Univ. Clinic

376 **Gynecologic Oncology and Cytopathology** McGowa

Participation in all aspects of clinical inpatient and office diagnosis an treatment of women with gynecologic cancer; related research. 4-week elective periods. Univ. Clinic

377 **Fetal Monitoring in Labor** Waxman

Experience in application of fetal monitoring, accumulation and interpre tation of data. Participation in intra-partum study of effects on the fetu of labor position, medication, and types of delivery. 4-week elective pe riods. Univ. Clinic

378 **Endocrinology, Clinical and Laboratory Applications** Fall

Clinical and laboratory approach to infertility and gynecological endo crinology. 4-week elective periods. Columbia Hosp.

379 **Clinical Obstetrics and Gynecology** Sites, McKelway, Titus

Participation in office practice of obstetrics and gynecology. 4-week elec tive periods.

380 **Clinical Obstetrics and Gynecology** Gahres, Radice

Participation in patient care, clinics, surgery, and delivery. 4-week elec tive periods. Alexandria Hosp.

383 **Clinical Obstetrics and Gynecology** Footer, Friedman

Participation in office practice of obstetrics and gynecology. 4-week elec tive periods.

385 **Clinical Gynecology** Gahres

Case assignments, rounds and conferences, including tumor board, gyne cologic pathology, preparation for surgery, attendance at surgery, post operative care. 4-week elective periods. Wash. Hosp. Center

* Required for medical students.

387 **Inpatient Obstetrics and Gynecology** Patow*
Supervised obstetrics and gynecology in a large military hospital; rounds and conferences. 4-week elective periods. Walter Reed Gen. Hosp.

389 **Clinical Obstetrics and Gynecology** Fabro
Participation in patient care, rounds, and conferences. 4-week elective periods. Columbia Hosp.

390 **Extramural Obstetrics and Gynecology Elective** (arr.)
The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

391 **Cytogenetics** (1) Jacobson
Clinical chromosomal anomalies in man, experimental design and data analysis in cytogenetics, two cytogenetics techniques, sex chromatin analysis, tissue culture procedures. Special students admitted with approval of instructor. (Fall, even years)

392 **Reproductive Genetics** (1) Jacobson
For medical students; open to graduate students with permission of instructor. Lectures with guest speakers, covering current methodology. Emphasis on human infertility; clinical case presentation and review utilized whenever possible. Major topics: gametogenesis, *in vivo* gamete manipulation and fertilization, nidation, and selective factors in development. Open to 15 2nd-year medical students. Univ. Hosp. (Fall)

395 **Gametogenesis** (1) Jacobson
For medical students; open to graduate students with permission of instructor. Seminar course with guest lecturers. Covers various clinical and experimental factors in gametogenesis. Emphasis on histogenesis of the gonads, environmental and clinical variables in infertility. Open to 25 1st-year students. Univ. Hosp. (Spring)

399 **Medical Genetics** (1) Jacobson
Clinical examples of genetic disease. Emphasis on basic principles such as linkage, heterogenity, mutation, and pedigree inheritance. The goal of the course is to provide the knowledge and skills needed to diagnose, manage, and counsel common genetic disorders. (Fall, even years)

Ophthalmology

Chairman: M.F. Armaly

Professors M.F. Armaly, D. Krueger *(Research)*
Clinical Professors J.H. King, Jr., M.M. Parks, M.G. Alper, L.E. Zimmerman
Associate Professors B.S. Fine *(Research)*, M.O. T'so *(Research)*, D.S. Friendly, L.H. Seaton II

* Dr. Patow is Chief of the Obstetrics and Gynecology Service at Walter Reed General Hospital.

Associate Clinical Professor L.M. King, Jr.

Assistant Professors R.N. Sunga, H.S. Zakharia, M.D. Olson, M.J. McC
(Research), B.A. Drum *(Research)*, J.M. Engelstein

Assistant Clinical Professors W.J. Romejko, W.P. Chalfant, Jr., R.E. duP
R. Day, J.H. Lodge, W.B. Glew, K.A. Simon, H.A. Urweider, B.H. Zea
H.N. Bernstein, D.K. Berler, J.N. Goldman, A.L. Fjordbotten, W.S. Gilb
H.S. Wicker, D.G. Albert, S.P. Ginsberg, M.H. Zimmerman, F.G. La Pi
F. Reeser, G.D. Rogell, J.F. O'Neill, D.E. Schwartz, P.T. Gavaris

Clinical Instructors S.S. Pappas, R.S. Deitch, H.I. Rodman, G. Liss, H.M.
Allister, L.E. Perraut, H.J. Starr, L. Kogan, J.F. Nowell, B. Ehrlich, D
Lanter, R. Huberman, P.A. Dorn, Jr., E.M. Zimmerman, J. Snyder, B
Bruner, M.E. Lederman, L.E. Rothkoff, M.D. Krinn, T. Frey, D.M. Wanie
W.S.N. Ibrahim, E.M. Titer, D.T. Casey, S. Stoleru, A.E. Eager, B
Brown III

281 Ophthalmic Pathology I L. Zimmerm

Basic science aspects of diseases of the eye. (Spring)

282 Ophthalmic Pathology II L. Zimmerm

Diseases of the eye as revealed by gross and microscopic examinatio
Open to 8 students. Armed Forces Inst. of Path. (Spring)

284 Ophthalmic Pathology III L. Zimmerm

Daily participation in an active service limited to pathology of the eye a
its adnexa. Inflammatory, degenerative, and neoplastic diseases compris
the major categories. 4-week elective periods. Armed Forces Inst. of Pat

380 Clinical Ophthalmology Lodg

Observation and participation in examination, diagnosis and managemen
of wide variety of ocular conditions. Special emphasis on developin
proficiency in conducting a general ophthalmic examination, recognitio
of abnormal findings and management of common ocular diseases an
emergencies. Lectures, rounds and seminars. Open to three senio
4-week elective periods. Wash. Hosp. Center

381 Clinical Ophthalmology Armaly and Jon

Observation and participation in examination, diagnosis and manage
ment of wide variety of ocular conditions in ambulatory patients. Specia
emphasis on developing proficiency in conducting a general ophthalmo
examination, recognition of abnormal findings and management of com
mon ocular diseases. Lectures, rounds and seminars. Open to two sen
iors. 4-week elective periods. Univ. Clinic

382 Clinical Ophthalmology Seatz

Observation and participation in examination, diagnosis and manage
ment of wide variety of ocular conditions. Special emphasis on develop
ing proficiency in conducting a general ophthalmic examination, recogni
tion of abnormal findings and management of common ocular diseases
Lectures, rounds and seminars. Open to two seniors. 4-week elective
periods. Nat'l. Naval Med. Center

390 Extramural Ophthalmology Elective (arr.)

Special elective program arranged for selected students at other institu
tions. Interested students should contact the chairman of the departmen

Orthopaedic Surgery

Chairman: J.P. Adams
Associate Chairman: H.L. Feffer

Professors J.P. Adams, H.L. Feffer, F. Leonard *(Research)*, D.W. McKay, R.S. Snell, P.I. Kenmore
Clinical Professors J.S. Neviaser, L.T. Peterson, C. Keck
Associate Professors R.J. Neviaser, W.P. Fortune, B.K. Slemmons, S.F. Gunther
Associate Clinical Professors R.L. Dow, B. Genner III, G.P. Bogumill
Assistant Professors H.O. Goller *(Research)*, S.S. Nason, D.B. Parsons *(Research)*, D. Lichtman
Assistant Clinical Professors G.J. Schonholtz, G.I. Baker, S.H. Eisenberg, K.A. Peterson, L.A. Ottenritter, H.S. Cattell, B.P. Vitek, C.W. McCutchen *(Biomechanics)*, A.I. Dobranski, S. Lavine, M.A. Schultz, U.M. Fortune, S.S. Haas, T.J. Radley, P.A. Moskovitz
Clinical Instructors R. Ottenberg, R. Conant, J.W. Harvey, R.M. Ackerman, R.J. Heilen, C.C. Liu, F.R.T. Nelson, T.J. Neviaser, R.L. Gaertner, R. Loeffler, C.C. MacCartee, Jr., J.F. Witte, H.N. Mininberg

*302 **Clinical Clerkship in Orthopaedic Surgery**
2 weeks at the Univ. Hosp.

380 **Orthopaedic Surgery** — Adams and Staff
Rotating program: one week of adult orthopaedics at University Hospital; one week of children's orthopaedics at Children's Hospital; one week of general orthopaedics at Walter Reed General Hospital, Andrews Air Force Base Hospital, or National Naval Medical Center. 4-week elective periods.

381 **Orthopaedic Surgery** — Kenmore
Participation in total care program of orthopaedic patients: daily rounds, conferences, seminars. 4-week elective periods. V.A. Hosp.

382 **Research in Orthopaedic Surgery** (arr.) — Leonard, Adams

383 **Sports Medicine** (arr.) — Haas, Lavine
Introduction to athletic injuries, including prevention and management. Interested students should contact Dr. Haas.

390 **Extramural Orthopaedic Surgery** (arr.)
The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

395 **Research in Orthopaedic Surgery** — Leonard
4-, 8-, 12-, or 16-week elective periods. Univ. Hosp.

* Required for medical students. Credit is a part of and is assigned after completion of Surg 303.

Otolaryngology

Chairman: J.J. McFarland, Jr.

Associate Clinical Professors J.J. McFarland, Jr., M. Fischer, D.N.F. F
banks, R.E. Pumphrey, Jr., B.M. Webb
Assistant Clinical Professors J.L. Levine, M.E. Krucoff, R.S. Page, Jr., J
Sabri, W.M. Trible, S. Epstein, B.A. Feldman, I.S. Jaffee
Clinical Instructors H.H.E. Scheidemandel, G.F. Miller, Jr., R.J. Bobys,
Isaacson, H.C. Stein, N.L. Barr, Jr., B. Modlin, A. Small

380 **Otolaryngology** McFarl
Care of inpatients and outpatients, diagnosis, and therapy; rounds and co
ferences. 4- or 12-week elective periods. Wash. Hosp. Center

390 **Extramural Otolaryngology Elective** (arr.)
The Department arranges for students to spend elective periods in oth
institutions. Interested students should contact the Chairman of the D
partment.

395 **Clinical Clerkship**
Experience includes inpatient and outpatient rotations together with o
erating room experience. 4-week elective periods. Nat'l. Naval Me
Center

Pathology

Acting Chairman: F.N. Miller, Jr.

Professors F.N. Miller, Jr., W. Newman, B.H. Smith, M.J. Matthews, M
Werner *(Laboratory Medicine)*, A. Breslow, L.S. Lessin, R.A. Malmgre
(Cytology)

Clinical Professors L.E. Zimmerman *(Ophthalmic)*, J.M. Blumberg, E.B. Helwi
(Dermatologic), N.S. Irey, C. Hoch-Ligeti, J.L. Luke *(Forensic)*, R.S. Me
ville *(Laboratory Medicine)*, R.E. Palmer, H.W. Casey *(Comparative)*, C.F
Cook

Professorial Lecturers P.D. Olch *(History of Medicine)*, T. Antonovych, W.C
Roberts *(Cardiology)*

Associate Professors W.L. Marsh, F.S. Jannotta, R.B. Lingeman, N. Saini, M.F
Dolan *(Hematology)*, D.S. O'Leary *(Laboratory Medicine)*, S.G. Kent, B.
Zook *(Comparative)*, Y. Al-Doory *(Laboratory Medicine)*, F.P. Abramso
L. Ortega, J.M.B. Hicks

Associate Clinical Professors V.E. Martens, W.J. Jaffurs, H.A. Schwamm, A.P
Cramer *(Blood Banking)*, F.B. Johnson, H.J. Norris, G.H. Guin, G.C
Brennan, W.F. Enos, D.R. Parkinson, A.S. Lineberger

Assistant Professors S.D.S. Hammersberg *(Medical Technology)*, J.G. Guccion, P.J. Robinson *(Microbiology)*, M.H. Fusillo *(Laboratory Medicine)*, J.A. Zeller *(Laboratory Medicine)*, E.W. Sutherland III *(Laboratory Medicine)*, Y.C. Oertel, R.H. Patterson

Assistant Clinical Professors M.J. Williams, I.D. Godwin, J.W. Howell *(Clinical Chemistry)*, B.D. Blackbourne *(Forensic)*, M.B. Furlong, Jr. *(Laboratory Medicine)*, B.J. Pearson *(Laboratory Medicine)*, H.H. Berman, L. Riddick *(Forensic)*, K.B. Barr *(Laboratory Medicine)*, D.J. Kelly, G.W. Kindschi, R.E. Nensel, H.J. Zirkin, J.W. Manhart *(Allied Health Science)*, L. Hefter, R. Montali *(Comparative)*, J.H. Roe, Jr., P. Snow

Instructors J.G. Blank, K.H. Fischer *(Allied Health Science)*

Clinical Instructors D.C. Hendrix *(Allied Health Science)*, C.R. Lissner *(Clinical Microbiology)*, M. Prodanovich *(Clinical Chemistry)*, H.A. Shulman *(Laboratory Medicine)*, L.O. Christoffersen *(Laboratory Medicine)*, R.D. Hughes, A.B. Adcook *(Laboratory Medicine)*, M. Bayley *(Laboratory Medicine)*, C.L. Czerwinski *(Laboratory Medicine)*, H.I. Doerr *(Laboratory Medicine)*, S.B. Engel *(Laboratory Medicine)*, J.W. Filleman *(Laboratory Medicine)*, E.S.G. Godette *(Laboratory Medicine)*, R.G. Hansen *(Laboratory Medicine)*, J.L. Higgins *(Laboratory Medicine)*, D.M. Klym *(Laboratory Medicine)*, M.B. Ksiazek *(Laboratory Medicine)*, S. Levin *(Laboratory Medicine)*, D.J. Marsick *(Laboratory Medicine)*, C.R. Martin *(Laboratory Medicine)*, D.G. Martin *(Laboratory Medicine)*, M.F. Pratt *(Laboratory Medicine)*, C.M. Roock *(Laboratory Medicine)*, B.L.S. Sinha *(Laboratory Medicine)*, H.T. Trettel *(Laboratory Medicine)*, R.J. Walsh *(Laboratory Medicine)*, B.A.S. Zimmerman *(Laboratory Medicine)*, T.E. Gran, K.L. Groves

Special Lecturers L.C. Johnson, R.S. Chandra, D.E. Blessing, E.C. Cager, T.D. Carpenter, C.C. Conboy, P.T. Geueke, E.E. Hogg, C.A. Miller, R.L. Peckham, J.H. Rollen, R.L. Santos, W.S. Slimak, F. Wright, S.M. Garman, R.C. Schoening, R.C.E. Scott, J.R. Crabbe, A.W. Green, B.R. Hinton, J.C. LaPorte, J.A. Maples, D.C. Nitsche, G.L. Roecker, L.F. Turner, S.W. Theune, C. Wang, K.M. Doetsch, L.F.B. Potempa, T.R. Roy, V.O. Strubeck, Jr., M.T. Jessee, J.A. Rosario, N.C. Brogdan *(Allied Health Science)*, K.R. Kahn, J.D. Myers, J.H. Saylor, D.R. Hunt, Jr., J.F. Schaumleffel, J.L. Shirey

Courses numbered 13 through 20 are limited to military personnel in the Medical Laboratory Technique Program.

13 Hematology (6) **Staff**

Basic hematologic procedures, diagnosis of abnormalities of cellular elements of blood and bone marrow, studies in blood coagulation, quality control in clinical hematology.

14 Blood Banking (6) **Staff**

Principles of immunohematology, blood donor center techniques, blood processing techniques, quality control in blood banking.

15 Clinical Laboratory Rotation (12) **Staff**

Instructions in laboratory technique, stressing the application of theories and principles of clinical chemistry, clinical microbiology, hematology, and blood banking in the day-to-day operations of the modern clinical laboratory.

16 Clinical Chemistry (5) St
(Formerly Path 11 [9])
Principles and techniques of blood chemistry analyses, including toxicolo cal analyses for drugs of abuse and environmental poisons.

17 Urinalysis (2) St
(Formerly Path 11 Clinical Chemistry [9])
Principles and techniques of urine chemistry and microscopic analysis.

18 Bacteriology (6) St
(Formerly Path 12 Clinical Microbiology [12])
Identification of pathogenic micro-organisms by morphologic and cultur techniques.

19 Parasitology (4) St
(Formerly Path 12 Clinical Microbiology [12])
Identification of human parasites and their life cycles, concentration meth ods, staining techniques and media for culture.

20 Serology (2) St
(Formerly Path 12 Clinical Microbiology [12])
Principles and techniques of antigen-antibody reaction and immunologica responses.

Courses numbered 121 through 128 are open only to students enrolled in th Bachelor of Science degree program with a major in the field of Medic Technology.

121 Introduction to Medical Technology (4) St
(Formerly 115–16 Introduction to Medical Science [1–1])
Eight-week orientation in laboratory medicine. (Fall)

122 Clinical Chemistry Lecture (3) Hammersberg and St
(Formerly 117–18 Principles in Medical Technology [4–4])
Ten-week lecture series on routine and special clinical chemistry tech niques. (Spring)

123 Clinical Microbiology Lecture (2) Fischer and St
(Formerly 117–18 Principles in Medical Technology [4–4])
Six-week lecture series on bacteriology, mycology and virology. (Fall)

124 Blood Bank Lecture (1) Marsh and St
(Formerly 117–18 Principles in Medical Technology [4–4])
Three-week lecture series on immunohematology and transfusion service (Spring)

125 Clinical Hematology Lecture (2) Hammersberg and St
(Formerly 117–18 Principles in Medical Technology [4–4])
Six-week lecture series on routine and special hematology and coagula tion. (Fall)

126 Selected Topics in Laboratory Medicine (2) Fischer and St
(Formerly 117–18 Principles in Medical Technology [4–4])
Three-week lecture and laboratory series on clinical parasitology. Mis cellaneous topics in fluid analysis. (Spring)

127 **Clinical Laboratory Rotation** (7) — Staff
(Formerly 119–20 Medical Technology Laboratory [10–10])
Sixteen-week rotation in the University Hospital laboratories. (Fall)

128 **Clinical Laboratory Rotation** (9) — Staff
(Formerly 119–20 Medical Technology Laboratory [10–10])
Twenty-five-week rotation in University Hospital clinical laboratories. (Spring)

129 **Pathology for New Health Practitioners** (2) — Miller
Lecture course with optional laboratory. Basic pathologic concepts and infectious diseases; languages of pathology; fundamental disease processes. Emphasis on pathogenesis and dynamics of disease. Causation, evolution, and morphology of pathologic changes in the principal diseases of each organ system presented in coordination with clinical lectures in *Idis 301*. (Fall and spring)

*201 **Pathology** (8) — Staff
A year course; required for 2nd-year medical students. General introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies.

202 **Diagnostic Conferences** (1) — Jannotta, Gusack
Case studies demonstrating pathologic significance of major clinical symptoms and physical signs. (Spring—1 hour a week)

203–4 **Pathology** (4–4) — Staff
For graduate students. General introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies. Limited enrollment. Prerequisite to Path 204: Path 203. (Academic year)

†205 **Comparative Pathology I** (3) — Zook
An introduction to the study of disease in vertebrates, comparison with disease in man. Mechanisms by which various agents provoke illness; body defensive reactions. Illustration of common diseases of various species, including material from captive wild animals. Recommended: courses in anatomy, histology, and physiology. (Fall)

†210 **Comparative Pathology Laboratory** (2) — Zook
Special assignments for dissection and study, including study of common diseases of captive wild animals. Path. Lab., Nat'l. Zoological Park (Fall—6 hours a week)

†215 **Perinatal Pathology Laboratory** (2) — Kent
Special assignments for dissection and study. Univ. Hosp. (Fall—6 hours a week)

216 **Necropsy Pathology** (1) — Saini
(Formerly two credits)
Review of current necropsy cases stressing interpretation of clinical symptoms and signs and radiographs on the basis of gross changes in the organs. V.A. Hosp. (Spring—1 hour a week)

*An interdepartmental course offered by the departments of pathology and biological sciences.
†Open to limited number of graduate students, with permission.

217 Gross Autopsy Pathology (1) Blackbourne, M

Same as Path 216. Univ. Hosp. (Spring)

220 Medical Mycology (2 or 4) Al-Do

Study of pathogenic fungi, mycotic diseases and their clinical aspe Emphasis on handling specimens, diagnosis and identification of etiol agents. Laboratory fee, $15. (Fall)

252 Forensic Pathology and Medical Jurisprudence (1) Mi

Somatic death, coroner and medical examiner systems, pathology of p cal and chemical injuries, medical licensure; the physician-patient relati ship and professional liability are discussed. (Spring)

253 Medicine in Shakespeare (1) Mi

Seminars with student and staff presentations covering the plays of W liam Shakespeare of medical significance. (Spring)

254 Medicine in Literature (1) Mi

Series of discussions with student and staff presentations covering nove dramas, nonfiction, and poetry of medical significance. (Fall)

260 Obstetric and Gynecologic Pathology (1) Jaff

Organ changes in normal and abnormal pregnancy, including both t mother and the fetus. Diseases of female genital system. (Spring)

***266 Comparative Pathology II (1)** Zoo

Participation in an autopsy service involving wild animals in captivity a comparison of diseases in various animal species with those in man. Lim ted to 4 students. Path. Lab., Nat'l. Zoological Park (Spring)

272–73 Seminars in Mycology (1–1) Al-Doo

Conferences and discussions on current topics and latest developmen in medical mycology. Open to graduate students and residents. May b repeated for credit. (Academic year)

275 Research in Mycology (2 to 4) Al-Doo

Participation in experimental studies in mycotic diseases. Research laboratory or community medicine related to mycology. May be repea for credit. (Fall and spring)

***277 Anatomic Pathology Clerkship I (arr.)** Sta

A practical course in gross human anatomy and pathology. Prerequisite Anat 201 or equivalent. Students spend up to 24 weeks full-time on t necropsy and surgical pathology services, receiving 1 semester hour credit for each 4-week period. Univ. and V.A. Hosps.

279 Ophthalmic Pathology I (2) Zimmerma

Basic science aspects of diseases of the eye. (Spring—2 hours a week

280 Surgical Pathology I (4) Newman, Smith, Palmer, Schwan

Surgical pathology service at participating hospitals. Examining specimen from current surgical cases, correlating with clinical manifestations. Uni V.A., Alexandria, and Andrews AFB hosps. (Spring—6 hours a week

* Open to limited number of graduate students, with permission.

*281 **Anatomic Pathology Clerkship II** (arr.) Staff

A practical course in gross and microscopic human pathology. Prerequisite: Path 201 or equivalent. Students spend up to 24 weeks full-time, or the equivalent part-time, on the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week full-time period. Univ. and V.A. hosps. (Spring)

282 **Ophthalmic Pathology II** (2) Zimmerman

Diseases of the eye as revealed by gross and microscopic examination. Concurrent registration for Path 279 required. 6 students. Armed Forces Inst. of Path. (Spring—3 hours a week)

*283 **Anatomic Pathology Clerkship III** (arr.) Staff

Necropsy and surgical pathology service. Prerequisite: Path 201 or 203–4. Graduate students receive 5 semester hours of credit for each 4-week period and may receive up to 30 semester hours of credit for 6 months full time. Medical students receive 5 semester hours of credit for each 4-week elective period. (Medical students: 4- or 8-week elective periods. Graduate students: fall or spring)

284 **Ophthalmic Pathology III** (5) Zimmerman

Daily participation in service limited to pathology of the eye and its adnexa. 4-week elective periods. Armed Forces Inst. of Path.

285 **Clinical Pathology** (5) Martens

Selected techniques of clinical chemistry, hematology, bacteriology. Student selects laboratory problem. 4-week elective period. Wash. Hosp. Center

286 **Perinatal Pathology** (5) Kent

Participation in perinatal (fetal and newborn) necropsies. Study of selected teaching cases. Examination of selected placentas for disease. 4-week elective periods. Univ. Hosp.

287 **Immunohematology and Blood Banking** (5) Marsh

Preparation and use of blood and blood products in surgery and in blood diseases, studied from the laboratory as well as the clinical viewpoint. Emphasis on management of acute clinical situation. 4-week elective periods. Univ. Hosp.

288 **Clinical Pharmacology and Toxicology** (5) Abramson

Correlations of therapeutic drug levels in hospitalized patients and outpatients with their clinical status. Evaluation of rational dosage schedules. Development and application of clinical laboratory methods for determination of drug levels. 4-week elective periods.

289 **Clinical and Anatomical Pathology** (5) Cook

Daily studies of surgical and necropsy pathology, including forensic pathology; clinical pathology projects, including hematology, isotopology, bacteriology. 4-week elective periods. Fairfax Hosp.

290 **Extramural Pathology Elective** (arr.)

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

*Open to limited number of graduate students, with permission.

291 Clinical and/or Anatomical Pathology (5) B. Smi

Students will have an opportunity to explore in depth a topic of intere to them in the field of pathology; library study. 4-week elective period V.A. Hosp.

293 Clinical and Anatomical Pathology (5) Palm

Participation in departmental activities, including clinical chemistry, bloo bank, microbiology, and hematology; surgical pathology; autopsy pathol ogy, including medico-legal autopsies. 4-week elective periods. Alexandri Hosp.

294 Forensic Pathology (5) Lu

Participation in the activities of the Office of the Chief Medical Examine of the District of Columbia: observation of scene investigation, participa tion in medico-legal autopsies, attendance at court trials, etc. 4-week ele tive periods. Office of the Chief Medical Examiner

***295 Comparative Pathology III (arr.)** Zoo

Participation in veterinary pathology service, including wild and domest animals. Prerequisite: Path 201 or 203–4, and 283. Graduate students re ceive 5 semester hours of credit for each 4-week period and may receiv up to 30 semester hours of credit for 6 months full time. Medical studen receive 5 semester hours of credit for each 4-week elective period. (Medical students: 4-week elective periods. Path. Lab., Nat'l. Zoologic Park, and Armed Forces Inst. of Path. Graduate students: fall or spring

296 Surgical Pathology II (5) Newma

Evaluation of surgical specimens and correlation with clinical status of pa tient, description of gross and microscopic findings on assigned cases. 4 week elective periods. Univ. Hosp.

297 Dermal Pathology (5) Helwi

Microscopic conferences, review of current material and study sets. 4- week elective periods. Armed Forces Inst. of Path.

298 Necropsy Pathology (5) Sta

Organ changes in disease, gross and microscopic examinations, preparation of protocols. 4-week elective periods. Univ. Hosp.

299–300 Thesis Research (3–3) Sta

(Fall and spring)

398 Advanced Reading and Research (arr.) Sta

Limited to students preparing for the Doctor of Philosophy general exami nation. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit (Fall and spring)

* Open to limited number of graduate students, with permission.

Pharmacology

Chairman: H.G. Mandel

Professors H.G. Mandel, V.H. Cohn, Jr., P. Mazel, E.B. Truitt, Jr. *(Research)*, R. Hertz *(Research)*, S.E. Fabro *(Research)*, J.A. Straw, I. Nakayama *(Visiting)*

Professorial Lecturers F.E. Hahn, J. Axelrod, E. Costa

Associate Professors P. Klubes, F.P. Abramson

Assistant Professors G.S. Edwards, H.C. Harder, J.W. Dailey, E.W. Sutherland III *(Laboratory Medicine)*, M. Shahvari, A.M. Suria

21–22 **Chemistry and Physics of Anesthesia** (3–3) Mazel and Staff

For students in Nurse Anesthetist programs. Fundamental concepts of physics; general chemistry, organic chemistry, and biochemistry and their application to medicine and anesthesiology, including chemistry of respiration, acid-base balance, clinical biochemistry and enzymology, hormones, radioisotopes, electronics, physicochemical properties of anesthetic agents, and other related topics. (Academic year)

110–11 **Pharmacological Basis of Anesthesia** (4–4) Mazel and Staff

(Formerly 110 Pharmacological Basis of Anesthesia [3])

For students in Nurse Anesthetist programs. Fundamental principles of pharmacology; drugs affecting the autonomic nervous system, central nervous system, and cardiovascular system; fundamentals of inhalation anesthesia; auxiliary drugs used in anesthesiology; endocrines, cancer chemotherapy; other topics. (Academic year)

114 **Drugs and the Consumer** (3) Cohn and Staff

General concepts concerning drug action in the body. Mechanism of action of some specific prescription and nonprescription drugs, including contraceptives; tranquilizers and sleep-inducing drugs; hayfever, headache and cold remedies; analgesics; antibiotics; vitamins. Issues related to development and marketing of drugs, drug safety, drug advertising, generic versus trade-name drugs, drug use in sports, drug use during pregnancy, smoking and health. No science prerequisite required. Limited enrollment. (Fall)

115 **Drug Abuse Education** (3) Cohn and Staff

Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems, legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana, hallucinogenic and psychedelic drugs. (Fall and spring)

120 **Readings in Pharmacology for Anesthesia** (arr.) Mazel and Staff

For students in Nurse Anesthestist programs. Assigned reading in anesthesia and related areas; preparation of reports.

130 **Seminar: Accessory Drugs in Anesthesia** (2) Mazel and S

For students in Nurse Anesthetist programs. Presentation of the phar cology and pharmacodynamics of accessory anesthetic drugs; emphasi those areas not covered in Phar 110–11.

158 **Pharmacology for New Health Practitioners** (2) Dailey and S

For students in allied health programs. Basic pharmacology course. D preparations, the basis of their therapeutic and toxic actions and fate in the body. Prerequisite: HCS 110, 111, 112. (Spring)

191 **Respiratory Care** (3) Mazel and S

Same as Anes 191. For students in Nurse Anesthetist programs. vanced techniques for care of patients requiring total respiratory port. (Fall)

195 **Electronics for Medical Personnel** (2) Mazel and S

Same as Anes 195. For students in Nurse Anesthetist programs. troduction to fundamental principles used in electronic instrumenta for monitoring patient status in operating room and intensive care Signal conditioning, processing and display techniques, special purpo instruments, safety hazards. (Fall)

201 **Pharmacology** (8) Straw and S

A year course; required for 2nd-year medical students. Lectures, labor tory, conferences on interaction of drugs and biological systems as a ba for rational therapy of disease. Prerequisite: Bioc 201, Phys 201.

203 **Fundamental Principles of Pharmacology** (2) Cohn and S

Basic principles of pharmacology, including drug-receptor interactio structure activity relationships, pharmacokinetics, membrane phenome cellular control mechanisms, drug toxicity. (Fall)

205–6 **Pharmacology** (4–4) Klubes and S

For graduate students. Lectures, laboratory, conferences on interaction drugs and biological systems as a basis for rational therapy of dise Pharmacodynamics, mechanisms of action, physiological disposition, t icity and relative evaluation of drugs. Prerequisite to Phar 205: Bioc 2 22, Phar 203, Phys 201, or approval of department. Prerequisite to Ph 206: Phar 205. (Academic year)

215 **Adolescent Drug Abuse** (3 or 4) Cohn and S

Not open to medical students. Offered off campus through the Colleg General Studies. Primarily for teachers, counselors, and school admi trators. Multidisciplinary lectures and discussions concerning the phy logical and psychological effects of narcotics, central nervous system st ulants and depressants, alcohol, marijuana, hallucinogenic and psych delic drugs; psychosocial factors leading to adolescent drug abuse; leg implications of drug abuse; prevention, control, and treatment of dru abuse. (Fall and spring)

216 **Drug Abuse Education Techniques** (3) Cohn and S

Not open to medical students. Offered off campus through the College General Studies. Primarily for teachers and counselors preparing to dire drug abuse education programs. Intensive review of current informatio on drug abuse, dynamics of group process, supervised practical experienc Prerequisite: Phar 215 and permission of instructor.

225 **Treatment of Narcotic Dependence** (arr.) **Cohn**

Students work on a one-to-one basis with a physician/psychiatrist in the treatment of drug dependence in local treatment programs.

252 **Seminar: Clinical Pharmacology** (2) **Staff**

Principles of experimental design for the evaluation of drug efficacy and safety in man. Problems in therapeutics; emphasis on drugs used in treatment of cardiovascular and infectious diseases. Enrollment limited. (Spring, even years)

254 **Frontiers in Pharmacology** (1) **Mazel and Staff**

For medical and graduate students. Recent advances and fields of research in pharmacology. Presentations by laboratory scientists from neighboring institutions. (Spring)

256 **Molecular Pharmacology** (2 or 3) **Hahn**

For medical and graduate students. Current theory on action of drugs, especially chemotherapeutic agents, at molecular level. Effect of drugs on biosynthetic processes of the cell with respect to DNA, messenger RNA, transfer RNA, ribosomes, protein, cell wall, and intermediary metabolites. Factors which alter action of drugs, such as drug interactions and resistance. (Spring)

258 **Cancer Chemotherapy** (1) **Mandel and Staff**

For medical and graduate students. Mechanisms by which drugs inhibit the growth of tumor cells. (Spring, even years)

259 **Developmental Pharmacology** (1) **Staff**

For medical and graduate students. Lectures, seminars, conferences. Teratogenic actions of drugs; pharmacological principles which apply during prenatal and perinatal development. (Spring, even years)

260 **Endocrine Pharmacology** (1) **Hertz and Staff**

For medical and graduate students. Lectures and seminars on recent advances in the pharmacology and mechanism of action of various hormones. (Spring, odd years)

267 **Pharmacological Research** (arr.) **Staff**

For graduate students. Research with staff members. May be repeated once for credit toward a Master of Science degree. (Fall and spring)

269 **Pharmacology Seminar** (1) **Mazel and Staff**

For graduate students. Recent advances in pharmacology. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

272 **Physiological Disposition of Drugs** (arr). **Cohn**

(Formerly three credits)

For graduate students. Fate of drugs in biological tissue. Absorption, distribution, chemical alteration, excretion of drugs: physical, chemical, and biological factors affecting these processes. Prerequisite: Phar 201 or 205–6. (Spring, even years)

275–76 **Advanced Topics in Pharmacology I–II** (1–1) **Klubes and Staff**

Lectures and seminars on advances in mechanisms of drug action, pharma-

cology of new drugs, theoretical aspects of pharmacology, laboratory tech niques. (Academic year 1977–78 and alternate years)

277–78 **Advanced Topics in Pharmacology III–IV** (1–1) Klubes and Sta
Continuation of Phar 275–76. (Academic year 1976–77 and alterna years)

279 **Special Topics in Pharmacology** (arr.) Staf
Selected aspects of drug action. Content differs each time the course i offered; may be repeated once for credit. (Fall and spring)

281 **Physiological Techniques in Pharmacology—Lecture** (2) Mazel, Stra
For medical and graduate students. Physiological techniques for obtaining information on mechanism and site of action of pharmacological agents Phar 281 may be taken without 282. Prerequisite: Phar 201 or 205–6. (Spring, even years)

282 **Physiological Techniques in Pharmacology—Laboratory** (2) Mazel, Stra
Accompanies Phar 281. Prerequisite: Phar 201 or 205–6. Prerequisite o concurrent registration: Phar 281. (Spring, even years)

283 **Biochemical Techniques in Pharmacology** (arr.) Edwards
For graduate students. Lecture and laboratory. Theory and practice of modern biochemical techniques applicable to study of metabolic fate and mechanism of action of drugs. Prerequisite: Phar 205–6. (Summer

285 **Readings in Pharmacology** (arr.) Mazz
For medical students. Assigned reading and preparation of report. (Fall and spring)

286 **Research in Pharmacology** (arr.) Staf
For medical students. Participation in experimental studies in pharmacol ogy, particularly endocrinology, cancer chemotherapy, or drug metabolism (Fall and spring)

287 **Readings in Drug Abuse Literature** (arr.) Cohn, Klubes
Both professional and nonprofessional literature in the general area of drug dependence. Informal monthly luncheon discussions. (Spring)

295 **Reading and Research** (arr.) Staf
Independent study for students preparing for the Master of Science degree May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staf
(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staf
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staf
Limited to Doctor of Philosophy candidates. May be repeated for credit (Fall and spring)

Physiology

Chairman: R.A. Kenney

Professors C.S. Tidball, R.A. Kenney, M.E. Tidball, M.M. Cassidy
Professorial Lecturer D.O. Carpenter
Associate Professors M.J. Jackson, M. McCally, R.A. Lavine, D.W. Watkins
Assistant Professors M.J. McCrea *(Research)*, M. Frank
Assistant Professorial Lecturers I.P. Weiss, E.A. Steane
Special Lecturer L.L. Langley

Departmental prerequisite: Phyl 201 or equivalent is prerequisite to all courses in physiology numbered above 201.

115 **Physiology for Nurse Anesthetists** (3) **Staff**

For students in Nurse Anesthetist programs. Emphasis on respiratory, cardiovascular, and autonomic nervous system physiology; a more general survey of other systems.

191 **Selected Topics in Human Structure and Function** (3) Kenney

Lecture (2 hours), laboratory (1 hour). Structural and functional basis of physiology. A required course for graduate students who have not had Anat 201 or equivalent. An undergraduate course; students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: BiSc 11–12 or equivalent and consent of instructor. Open to Columbian College of Arts and Sciences students with the approval of the student's major adviser. (Fall)

*201 **Physiology** (8) **Staff**

Lecture (8 hours), laboratory (2 hours), conference (1 hour). Cellular, organ system, and applied human physiology. Prerequisite for graduate students: Anat 201 or Phyl 191, or equivalent; Bioc 201 or 221–22 (Bioc 222 may be taken concurrently); or consent of chairman of department. Open to Consortium students only with permission of department chairman. (Spring)

212 **Neurobiology** (3) **Staff**

For graduate students. Same as Anat 212 and Idis 212. An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstration, and laboratory. Laboratory fee, $25.

221 **Seminar** (1) **Cassidy**

Staff and student presentations from literature. Present work discussed, experimental design and scientific deduction evaluated. Topics to be announced. Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

251 **History of Medicine** (1) **E. Tidball**

Survey of the great contributors to physiology and medicine in the context of the times in which they lived and worked. (Fall)

* Required for medical students, open to graduate students.

252 **Physiological Basis of Sexuality** (2) C. Tidball, E. Tidb
Conference and discussion on topics including communication, psychosexual development, physiological responses, homosexuality, population control and family planning, fertility and sterility, and other topics of interest to the class. (Fall)

253 **Physiology of Fluid Balance and Hydrogen Ion Regulation** (2) Cassid
Discussion on principles of fluid and acid-base balance and the application of these principles to specific situations. (Fall)

261 **Gastrointestinal Physiology** (1 or 2) Jackson, Dobbins
Weekly seminar; role of basic sciences in gastroenterology; intra- and extra-mural speakers. An approved paper required for 2 semester hours of credit. May be repeated for credit. (Fall and spring)

262 **Topics in Cardiovascular Physiology** (2) Kenney
Survey, at an advanced level, of aspects of cardiovascular physiology especially as interrelated with the respiratory and renal systems. (Fall

265 **Review of Endocrinology** (1) Jackson
Review of basic endocrinology. (Fall)

266 **Advanced Endocrinology** (2) Jackson
Review at advanced level of selected topics in endocrinology and metabolism. Concurrent registration in Phyl 265 required. (Fall)

267 **Renal Physiology** (2) Kenney
Lecture or conference 2 hours a week. Overview of renal physiology at advanced level.

268 **Computer Utilization in Physiology and Medicine** (2) C. Tidball
Lecture 1 hour a week, practical experience at student's convenience. Orientation to digital and analog mini-computers. Programming in several languages. Experience with one or more computers. No previous computer experience necessary. (Fall)

269 **Topics in Neurophysiology and Psychophysiology** (2) Lavine
Selected topics in contemporary neurophysiology, including methods of data collection and analysis, control mechanisms involved in movement and behavior and sensory processing. Open to students in the School of Engineering and Applied Science with permission of instructor. (Fall)

282 **Experimental Physiology** (5) Staff
Participation in an ongoing research program in the Department. Programs are currently available in the areas of membrane physiology, intestinal transport, neurophysiology, and cardiovascular physiology. 4-week elective periods.

284 **Advanced Physiology** (5) Staff
Guided study and/or laboratory experience at an advanced level in a subfield of physiology. Prior arrangements should be made with the individual faculty member. 4-week elective periods.

290 **Extramural Physiology Elective** (arr.)

The department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the department.

295 **Research** (arr.) **Staff**

By special arrangement with individual Staff members. Approximately 4 clock hours in the laboratory for each semester hour of credit. (Fall and spring)

298 **Comprehensive Physiology** (arr.) **Staff**

Guided review of selected areas of Physiology appropriate to the student's graduate program. This course satisfies the requirements for the Master's Comprehensive Examination, the Field Examination for doctoral students minoring in Physiology, and Part I of the Cumulative General Examination. Prerequisite or concurrent registration: Phyl 221. (Fall)

299–300 **Thesis Research** (3–3) **Staff**

(Fall and spring)

396 **Advanced Reading and Research** (2) **Staff**

Limited to students preparing for the Doctor of Philosophy general examination. Tutorial literature survey of a subfield of Physiology and of pertinent areas of the candidate's minor field. This course satisfies the requirement for Part II of the Cumulative General Examination in Physiology. (Fall and spring)

397 **Development of Dissertation Problem** (2) **Staff**

Limited to students preparing for the Doctor of Philosophy general examination. Preparation for written and oral presentation of dissertation problem. This course satisfies the requirement for Part III of the Cumulative General Examination in Physiology. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Psychiatry and Behavioral Sciences

Acting Chairman: J. Wiener

Professors L. Yochelson, J.E. Rankin, T.G. Webster, R.E. Rieger *(Research)*, D. Reiss, H. Shapiro *(Research)*, J. Wiener

Clinical Professors T.D. Noble, S. Berman, M. Kleinerman, M.deG. Ruffin, N. Taub, S. Yochelson *(Criminal Behavior)*, L. Ferber, P. Gray, P. Chodoff, H.A. Meyersburg, F.N. Waldrop, H. Weiner *(Experimental Psychology)*, H. Resnik, J.D. Noshpitz, W. Stark, B. Brown, H.H. Work, H. Jason, L. Cytryn, E.I. Kushner, J. Kafka, M. Meltzer, J. Spurlock, M. Katz, C.T. Bever, S.L. Baker, Jr., S. Perlin, G.R. Ticho, R.L. Shapiro, E.A. Hargrove

Professorial Lecturer H.D. Lederer

Associate Professors J.J. McMillan *(Psychology)*, W.H. Scott

Associate Professorial Lecturer G.E. Morris *(Allied Health Science)*

Associate Clinical Professors H.P. Laughlin, I.H. Kaiser, D. Eden, S.I. Szara *(Psychopharmacology)*, J.G. Rubin, E.S. Fleming, R.M. Greenberg, W.D. Kehne, J.L. Sheridan, J.H. Yacoubian, J. Durell, B. Olshaker, H.B. Lehrman, I.H. Marill, T.D. Reynolds *(Experimental Psychiatry)*, P.S. Weisberg, C.J. Frederick *(Medical Psychology)*, L.D. Robinson, A.S. Abraham, B.C. Straight, J. Baker, J.J. Francis, A. D'Agostino, W.J. Stockton, R. Peele, J.T. Quattlebaum, D.D. Cowell, M.R. Haas, R. Dupont, Jr., A. D'Costa, B. Wedge, P.F. Wohlford, J.H. Menetrez, B.L. Burris, C.C.H. Cullander, D.L. Tippett, A. Ward, Jr. *(Sociology)*, H.S. Winston, J.E. Meeks, J. Smith, R.M. Coleman, R.N. Butler, M.J. Stern, G. Scarcella, J.B. Erdmann, J. Zinner, C.B. Robinowitz, F.M. Ochberg, W.G. Tompkins, S.J. Wolin, J.C. Folsom

Assistant Professors B.B. Doyle, J.A. Frank, Jr., P.J. Steinglass, D.I. Davis, K. Ravenscroft, Jr., L. Sank, R.B. Gerber, J.J. Katzow

Adjunct Assistant Professors A.T. Billett *(Social Work)*, M.M. Reynolds *(Social Work)*, R.S. Richmond *(Social Work)*

Assistant Clinical Professors S.S. Tenenblatt, R.A. Rogers, J.A. Farrell, F.G. Hilkert, I.D. Milowe, W.C. Johnson, R.A. Frank, L. Schaffer, T.M. Mackenzie, C.W. Kehne, M.A. Woodbury, W.H. Young, Jr., J.H. Bouma, S. Gordon, Jr., D.A. Lanham, S. Mourat, S.L. Auster, H.A. Greenberg, G. Cotos, M.L. Garrett, H.A. Hoffman, J.M. Post, E. Friedman, R.A. McElroy, F.B. Thomas *(Social Work)*, B. Crowley, B.P. McKaig, W. Davidson, J.A. Schoettler, S. Weissman, M.S. Glatt, A.E. Marans, E.S. Denham, P.B. Hollyd, D.H. McKnew, Jr., L.A. Cove, M. Engel, J.L. Evans, L. Dizmang, B. Pakull, C.R. Gray, M.J. Chalick, G. Schaeffer, R.T. Lewit, A.M. Messore, W.F. Weber, R.W. Wadeson, Jr., M.T. Advani, E. Black, D.H. Fram, A.B. Zients, G.A. Tripp, M. Brody, D. Grodsky, J.L. Hatleberg, K.L. Kaplan, D.D. Pollock, A. Saenz, E.A. Sorrentino, L.J. Tatnall, E. Taylor, S. Greenspan, B. Kraff, D.Y. Patterson, M.R. Goldberger, D.J. Gardner, R.L. Gross, J.L. Wellhouse, J.W. Voell, J.R.S. Malkin, R.A. Ratner, D.R. Meers, S.H. Lipsius, B. Landau, A.H. Stein, L.R. Conte, B.L. Frankel, P.A. Lange, N.A. Schweig, S.L. Billet, J.C. Chatel, K.P. Gorelick, R. Hirschfeld, H. Steinberg, R.C. Bristol, R.M. Costell, M.D. Fitz, R.M. Auster, L.D. Levi, S.L. Goodman, G.D. Legler, S.A. Savitz, W.F. Thompson, M. Giller, J.A.F. Chused, J.R. Sealy, M. Hertzman, S.K. Kolansky, R.A. Nover, S. Rosenblum, D.E. Scharff, J.L. Read, S.R. Piecznik, S.W. Anderson, G.A. Ellsworth, D. Charney, E.C. Holscher, Jr., C. Goldberg *(Psychology)*, F.K. Johnson, P.E. Chanel, C.B. Feinstein, D.T. Mosher, A. Olaciregui, T. Craig, M. Boverman, C.V.A. Cabrera *(Social Work)*, D.I. Joseph, L.E. Kruez, D.G. Lipman, R.B. Posner, N.L. Wilson, G.H. Miller, H.W. Rice, C. Goldberg, J.P. Waletzky, L. Turner, K. Kessler

Assistant Professorial Lecturers A.S. Fonaroff, A. Zappala

Instructors M.E.P. Oliveri *(Research—Psychology)*, D.C.T. Choate *(Social Work)*

Adjunct Instructor S.S. Lynn, E.K. Wolf *(Social Work)*

Clinical Instructors H. Plotsky, W.H. Dobbs, W.A. Hamman, S.E. Samenow *(Psychology)*, E.W. Cotlove, K.L. Owens *(Social Work)*, A.H. Reesu *(Social Work)*, F.J. Boruch, R.G. Ammerman, R.M. Kapit, R.J. Harmon

Lecturer J.D. Robinson *(Visiting—Psychology)*
Special Lecturers J. Hoffman, S.M. Fisher, J.B. Chassan *(Biostatistics)*, P. Hamosh, D. Schuyler, R.L. Siegel, M.M. Herenda, S.L. Aledort

*252 **Development of the Person** — Katzow and Staff
For 1st-year medical students. Basic presentation of normal personality development. Principles of psychological aspects of human growth and development. (Spring)

*301 **Introduction to Clinical Problem Solving** — Doyle and Staff
For 2nd-year medical students. Mental mechanisms, psychopathology, introduction to psychiatric syndromes, clinical interviewing, behavioral sciences in clinical medicine. (Fall)

*302 **Clinical Clerkship** — Katzow, Gerber, Kapit, Giller, Hoffman, and Staff
Supervised examination, diagnosis, treatment of outpatients and inpatients at University, St. Elizabeths, Washington Veterans Administration hospitals, Psychiatric Institute, and Area C Mental Health Center; case conferences, seminars on psychiatric referral, "psychiatric" drugs, community resources. Psychiatry in general practice stressed. (Fall and spring)

350 **Basic Psychopathology and Psychodynamics** — Bever
A seminar format using reading materials and clinical demonstrations to explore the basis of mental illness. Limited to 25 2nd-year medical students. (Fall)

351 **The Role and Professional Identity of the Physician** — Webster, Katzow, Robinowitz, Doyle
Small group discussions exploring the personal and social factors of the physician's role. Limited to 10 2nd-year medical students per group. (Fall and spring)

352 **Common Personality Configurations** — Lipsius
Selected commercial movies, viewed both during class and in student's free time, provide material illustrative of personality configurations and life styles to be analyzed in group discussions. Limited to 12 2nd-year medical students. (Fall)

353 **Basic Psychoanalytic Concepts** — Staff
Basic psychoanalytic concepts such as dreams, transference phenomena, the unconscious, and the various components of personality structure. Participation in discussions focusing on psychoanalytic issues and the relevance of such concepts to the practice of medicine in general. For first- or second-year medical students. Wash. Psychoanalytic Soc. Bldg. (Spring—8 sessions of 2 hours each)

354 **Human Sexuality** — Staff
Normal sexual development; unusual sexual patterns; emphasis on sexual patterns in the context of the individual's growth experiences and current life situation. For first- or second-year medical students. Wash. Psychoanalytic Soc. Bldg. (Spring—8 sessions of 2 hours each)

365–66 **Seminar: Clinical Introduction to Family Diagnosis and Therapy** (3–3) — Steinglass, Reiss, and Staff
Open to medical students and advanced students in clinical psychology.

*Required for medical students.

381 Psychiatric Research: Human Development Meyers

Readings in human development. Direct observation and experience w normal and disturbed development sequences in a child daycare setti Videotaping. Weekly seminar.

382 Clinical Psychiatry Cowell, G

Participation in clinical care of patients hospitalized for emotional a mental disturbances; individual and group therapy, somatic therapies, p chodrama. 4-week elective periods. St. Elizabeths Hosp.

383 Psychiatric Day Care Adv

Participation in the evaluation of patients referred for day care and in t various activities and programs in the day care center. Research pertai ing to the day care center in its role in the treatment of psychiatric p tients. 8-week elective periods. Psychiatric Inst. of Wash.

385 Schizophrenic Reactions Bullard*, Marg

Observation and study of the administrative management and treatment patients. Staff meetings, selected readings, individual instruction, compl case write-ups. 4-week elective periods. Chestnut Lodge, Rockville, Md.

386 Psychiatric Research Cow

Participation in research programs involving clinical and experimental in vestigations of human behavior. 4-week elective periods. St. Elizabe Hosp.

387 Clinical Psychiatry Katz

Students perform as residents; admit patients, work with treatment team organize treatment plan and treat patients in cooperation with and under supervision of other treatment team members. Emergency room and con sultation work if desired. Students will attend all resident didactic courses. 4-, 8-, or 12-week elective periods. Univ. Hosp.

389 Psychiatric Day Hospitalization Crowl

(Formerly Psychiatric Day Care)

Participation in the diagnostic and treatment programs of a separate and independent day hospital designed to prevent and replace full-time psy chiatric hospitalization. Research in the area of partial hospitalization. One to three 4-week elective periods. Potomac Foundation for Mental Health

390 Extramural Psychiatry Elective (arr.) Katzow

The department may arrange for students to spend elective periods at other institutions. Interested students should contact J.J. Katzow.

391 Research: Constitutional Psychiatry and Psychiatric Aspects of Criminal Behavior S. Yochelson

(1) Somatotypy, genetics, encephalography, and sensory deprivation; em phasis on criminal behavior. (2) Detailed study of the social, anthropolo gical factors producing criminal behavior; psychologic testing. 4- or 8- week elective periods. St. Elizabeths Hosp.

392 Administrative Psychiatry Robinson

First-hand experience with new psychiatry-mental health concepts relating to new legislation, recent court decisions regarding the right to treatment

* Dr. Bullard is Senior Consultant at Chestnut Lodge.

commitment, quality assurance, funding, PSRO. Open to two seniors. 4-week elective periods. St. Elizabeths Hosp.

393 **Independent Studies** — Webster, Katzow

Clinical or research experience and instruction in aspects of psychiatry not included in clerkship; selections on basis of individual student interest. 4-week elective periods. Univ. Clinic and elsewhere, individually arranged.

394 **Elective in Forensic Psychiatry** — Saiger

Work in the rehabilitation of criminal offenders. 4-week elective periods. St. Elizabeths Hosp.

395 **Substance Abuse** — Davis

Individualized program dealing with drug and alcohol abuse. GWU Center for Family Research. Clinical and research experience.

396 **Alcoholism: Inpatient Treatment** — Scarcella

Participation in evaluation and treatment of patients hospitalized for chronic alcoholism. 4- or 8-week elective periods. V.A. Hosp.

397 **Family Medicine** — Sank

Working with medical outpatients who require some form of psychiatric intervention or evaluation of a brief nature. 4-week elective periods.

398 **Alcoholism: Outpatient Treatment** — Advani

Inpatient and outpatient care in all stages of alcoholism. Interested students should make arrangements with the instructor. Psychiatric Inst. of Wash.

401 **Residential Treatment for Disturbed Adolescents** — Auster

Participation in staff activities in a residential treatment facility for disturbed adolescents. Open to one student; those interested should contact the instructor.

402 **Outpatient Psychiatry** — Katzow

Open to two seniors. Participation in evaluation and treatment of selected psychiatric outpatients in the OPD of the Ambulatory Care Division.

403 **Psychiatric Day Care: The Adolescent Patient** — Quattlebaum

Open to two seniors. Partial hospitalization of adolescent patients. Participation in patient management. Psychiatric Inst. of Wash.

405 **Child Psychiatry** — Tatnall

Open to two seniors. Externship in child psychiatry. Psychiatric consultation to various pediatric wards. Outpatient evaluation and treatment of child psychiatric patients and their families. Children's Hosp.

406 **Family Studies** — Boverman

Study of families needing psychiatric help for physical illnesses. Open to one senior; those interested should contact the instructor.

407 **Forensic Psychiatry** — Ward

Supervised research in the training and research divisions of forensic programs. Open to two seniors. 8- or 12-week elective periods. St. Elizabeths Hosp.

Radiology*

Chairman: S.D. Rockoff

Associate Chairman: D.O. Davis

Directors of Divisions: S.D. Rockoff *(Diagnostic Radiology)*, R.C. Reba *(Nuclear Medicine, Co-director)*, V.M. Varma *(Nuclear Medicine, Co-director)*, D.J. Goodenough *(Radiation Physics)*, J.G. Maier *(Radiation Therapy)*

Professors S.D. Rockoff, J.G. Maier *(Radiation Therapy)*, D.O. Davis, W. McSweeney, C.C. Rogers *(Radiation Therapy)*, C.W. Ochs, R.C. Reba *(Nuclear Medicine)*

Clinical Professors A.C. Wyman, M.M. Reeder, J.L. Doppman, Q.E. Crews, J.J. Smith *(Nuclear Medicine)*

Professorial Lecturer J.R. Andrews

Associate Professors M. Majd, V.M. Varma *(Nuclear Medicine)*, K. Poulsen *(Research—Nuclear Medicine)*, W.C. Eckelman *(Radiopharmacology)*, T. Lawson, D.L. Breckbill, J.A. Deye *(Radiation Physics)*, M.E. Bradley *(Research)*, S.H. Shah, A.M. Lewicki, D.J. Goodenough *(Radiation Physics)*, F.H. Attix *(Research—Radiation Physics)*

Associate Clinical Professors H.J. Kicherer, C.F. Murphy, W.J. Nelson, G. Augustin, J.M. Hallenbeck

Assistant Professors S.N. Lee *(Radiation Therapy)*, B.L. McClennan, B. Potter, N.J. Smith *(Radiation Therapy)*, R. Gordon *(Research)*, P.T. Kirchner, L.R. Goodman, W.J. Rzeszotarski *(Research—Nuclear Medicine)*, K.E. Weaver *(Radiation Physics)*, G.L. Edwards *(Allied Health)*, T. Padikal *(Radiation Physics)*, E.W. Bradley *(Research—Radiobiology)*

Assistant Clinical Professors S.R. Bersack, M.D.M. Faris, A.S. Cigtay, M.A. Thomas, J. Burwell, R.A. Butler, Sr., F.V. Schumacher, C.F. Tedford, R.J. Lull, W.W. Olmsted, R. Blumhardt, D.L. Johnson *(Nuclear Medicine Technology)*, M.C. Johnson, M.S.L. Lesar, E.R. Jacobs, V.L. McManaman *(Nuclear Medicine)*, J.A. Russotto, G. Cohen *(Radiation Physics)*, J.P. Greer *(Nuclear Medicine)*, J.D. Marriott, W.H. McCartney *(Nuclear Medicine)*, F.H. Gerber *(Nuclear Medicine)*, S.J. Kurzbard, C.M. Citrin, M.E. Siegel *(Allied Health Science)*, R.F. Carretta

Instructors S.H. Moore *(Radiation Therapy)*, R.M.S. Beck *(Radiologic Technology)*, D.M. Gibbons *(Nuclear Medicine)*, N.L. McElroy *(Radiation Physics)*, R.D. Ornitz *(Research)*

Clinical Instructors G. Tievsky, S.M. Perl, L. Wener, R.J. Morton, Jr., J.A. Thomas, E. Westbrook, W.G. Paullin, J.L. Murray

Special Lecturers A.L. Byrne, F.R. Pugh, R.G. Conant *(Nuclear Medicine Technology)*, G.E. Flook, W.E. Fulps, J.C. Hergenrother *(Nuclear Medicine Technology)*, W.F. Mellen, J.L. Firoved *(Nuclear Medicine Technology)*, M.J. Duea, H.F. Midkiff, *(Nuclear Medicine Technology)*, J.A. Waliszewski *(Nuclear Medicine)*, J.H. Coenen *(Nuclear Medicine Technology)*, B.A. Kendall *(Nuclear Medicine Technology)*, L.R. Oly, H.L. Hise, Jr. *(Nuclear Medicine*

* Unless otherwise indicated, all faculty appointments are in the *Diagnostic Radiology* division.

Technology), W.J. Weiler *(Nuclear Medicine Technology)*, J.H. Arthmann *(Nuclear Medicine Technology)*, C.E. Boccia, P.F. Jensen *(Nuclear Medicine Technology)*, W.B. Lowe, C.M. Richardson, J.W. Andrews *(Nuclear Medicine Technology)*, M.G. Withrow, Jr., N. Hodges, S.L. Horst, R.A. Mollett, L.F. Wesley, C.J. Zimmerman, Jr., R.W. Carlson, J.S. Thorkelsen

Courses numbered 40 through 190 are limited to students in the A.S. or B.S. degree programs in radiologic technology, nuclear medicine, and radiologic science and administration.

40 **Clinical Training and Experience in X-ray Technology I** (2) **Staff**
Instruction and close supervision in the use of radiologic techniques in examining the digestive, urinary, female reproductive, central nervous, and circulatory systems; chest and abdomen radiography, orthopaedic radiography, ENT and neurologic radiography, portable radiographic examinations, pediatric radiography, nuclear medicine, radiation therapy.

41 **Clinical Training and Experience in X-ray Technology II** (2) **Staff**
Continuation of Rad 40. Prerequisite: Rad 40.

42 **Clinical Training and Experience in X-ray Technology III** (2) **Staff**
Continuation of Rad 40 and 41. Prerequisite: Rad 40, 41.

43 **Clinical Experience in Nuclear Medicine I** (4) **Staff**
Practical study and supervised performance; emphasis on indications and contraindications, procedures and methods, physiological and procedural factors which may result in a false study, radiation safety techniques, and administrative procedures.

44 **Clinical Experience in Nuclear Medicine II** (5) **Staff**
Continuation of Clinical Experience in Nuclear Medicine I. Prerequisite: Rad 43.

50 **Radiologic Anatomy I** (4) **Staff**
Human anatomy as applied to radiologic terminology. Structure and function of the human skeleton and topographical anatomy, both normal and pathological. Prerequisite: Med 101 or equivalent.

51 **Radiologic Anatomy II** (4) **Staff**
Human anatomy as applied to radiographic procedures. Structural and functional approach, application to radiography of the digestive, respiratory, excretory, endocrine, reproductive, and nervous systems and the organs of special sense. Some discussion of medical and surgical diseases. Prerequisite: Rad 50.

55 **Stationary and Rectilinear Imaging** (3) **Staff**
Related anatomy, physiology, and pathology of imaging procedures; basic methodology of these and related procedures, including bone, brain, liver, liver function, bone marrow, lung, liver-lung, transmission, cardiac blood pool, cisternography, spleen, parathyroid, pancreas, lung ventilation, parotid ventriculography; miscellaneous scans; brain and cardiac flow studies.

56 **Hematologic and Radionuclide Dilution Procedures** (3) **Staff**
Related anatomy, physiology, and pathology of hematologic and radionuclide dilution procedures; basic protocol for these procedures, including

plasma volume and related plasma studies, red cell volume and related cell studies, studies of iron metabolism, and the placental localization scanning.

57 Organ Concentration-Excretion Measurements (3)

Related anatomy, physiology, and pathology of organ concentration-ex tion measurements; the procedure for those measurements, including roid uptake and its variations, thyroid scan, metastatic chest survey, r gram, renal scan, and renal flow study.

58 Gastrointestinal Absorption Measurements (1)

Related anatomy, physiology, and pathology of gastrointestinal absorp measurements; the procedure for those measurements, including fat abso tion studies (triolein and oleic acid) and the three stages of the vita B-12 absorption study (Schilling test).

59 Competitive Binding Radioimmu assay (2)

Basic concepts of radioassay; basic procedure for any competitive b ing radioassay. Specific concepts and procedure for T3, T4, and se B-12 determinations; factors affecting those determinations and the in pretation of their results.

60 Radiographic Technique I (4)

Theoretical and practical study of X-ray machines, equipment, patient p sitioning, and radiographic qualities; history and development of X-r phototiming, X-ray tubes, and Bucky grids and their uses; anatomic landmarks, radiographic terminology, exposure factors, and variations; diographic calibration (quality and quantity); marking of films and fact governing good film quality. Includes laboratory work.

61 Radiographic Technique II (4)

Preparation of exposure charts and use of radiation protection devic practical applications of technical uses of stationary and portable equi ment under supervision; techniques for pediatric radiographs and meth of positioning and restriction; intra-oral radiography techniques. Pho fluorographic chest units, departmental floor plans, basic office procedure Includes laboratory work. Prerequisite: Rad 60.

62 Darkroom Technology (3)

Processing of film after exposure; care and handling of conventional a automatic darkroom equipment; types of film, handling and storage; mi ing and handling of chemicals and the action and quantity of these chem cals in the processing of film; effects of heat and cold on these chemicals diagnosing of various improper developing techniques. Includes laborato work.

65 Basic Chemistry (3)

Introduction to basic chemistry, kinds of matter, atomic structure, th periodic table, chemical bonding, formulae and equations, solutions, acid base reactions; introduction to organic chemistry and biochemistry; labo ratory sessions.

66 Radiopharmaceuticals (3)

Uses of radionuclides in medicine, basic principles of a Mo-99/Tc-99m generator, radiopharmaceuticals and their action within the body, prepara tion of radiopharmaceuticals using generator-produced nuclides, quali control, accountability, procurement, clinical orientation.

70 **Electronics of Radiology I** (4) **Staff**

Fundamental concepts of electricity such as battery types and construction, power and energy, simple circuits, series/parallel circuits, compound circuits. Description and function of various components of the circuits such as resistors and capacitors, magnetism and alternating current, magnetism and inductance, inductance and capacitance, and capacitance and transformers. Includes laboratory work.

71 **Electronics of Radiology II** (4) **Staff**

Applications of electronic principles to X-ray equipment and components; transformers, meters, generators, rectifiers, basic electronics; electron tubes and solid state devices; equipment trouble-shooting and maintenance. Includes laboratory work. Prerequisite: Rad 70.

72 **Radiation Instrumentation** (5) **Staff**

Theoretical and practical aspects of radiation detectors; types, components, and operation of detectors; collimators; geometry; introduction to rectilinear scanning; introduction to stationary imaging; clinical orientation.

75 **Fundamentals of Atomic and Nuclear Physics** (3) **Staff**

Basic units, quantum theory, Bohr theory, atomic and nuclear structure, radioactivity and decay, alpha and beta particles, electromagnetic radiation, series decay, radioactive equilibrium, I.C.R.U.

80 **Mathematics of Radiology** (3) **Staff**

Principles of mathematics as applicable to the physics of radiologic technology; use of the slide rule, including multiplication, division, powers, and



Students evaluate an x-ray in the GWU Hospital emergency room.

roots; solution to linear equations in the unknown; cartesian coord plane; slope of straight line; determining linear equations from given ditions; graphic solution of two or more linear equations.

81 Basic Mathematics (3)

Review of basic high school mathematics, basic algebra, common and tural logarithms and their manipulation, linear and logarithmic grap and manipulation of a log-log side rule.

82 Applied Technical Mathematics (3)

Mathematics as applicable to nuclear medicine; basic decay formula its variations, calculation of doses of radionuclides, basic statistics ter nology, frequency distributions, confidence limits, standard error, effi distribution of counting time, statistics relating to rectilinear and stati ary imaging.

90 Ethics (1)

Ethics of physician/technician/patient relationships. Responsibilities, b moral and legal, to the doctor/patient and technologist relationship; rapport expected of the technologist.

91 Special Projects in Radiology (arr.)

Independent study on any aspect of radiology worked out between student and the instructor.

92 Basic Physics (3)

Remedial course for students deficient in physics training. Includes ba atomic structure, elements, molecules, compounds, electro and magne statics, motors, transformers, concepts of electricity, and circuits. Intr duction to radiological physics including radiation protection, radiologi units, and interactions of radiation with matter.

93 Radiobiology and Radiation Dosimetry (3)

Interaction of radiation with matter; radiation effects on molecular, cell lar, tissue, and organ levels; genetic and somatic effects of ionizing radia tion; classical and M.I.R.D. methods of absorbed dose calculation.

94 Radiological Safety (3)

Introduction to radiation safety; units of radiation exposure and dose licensing; AEC regulations; accountability and records, receipt, storage handling, transportation, and disposal of radioactive materials; monitoring shielding; dose-distance relationships; personnel dosimetry; radiation ill ness; radiac instruments; radiation safety clothing; radioactive "spill" pro cedure.

95 Radiation Safety (3)

Radiation tolerance, safety, and reporting photodosimetry; protective meth ods, control devices, shielding, half-life, detection, detection equipment, design and operation, thermoluminescence (its operation and uses), termi nology and subject matter. Includes laboratory work.

96 Radiation Biology (3)

Effects of radiation on basic cell structure through organ and whole body exposure; nature of radioactive particles and emissions, their effects on biological materials at the cellular and organismic level, particularly on the mammalian systems.

97 **Special Procedures** (3) **Staff**

Techniques of radiology employing contrast medias. Fluoroscopy, spot films, body section radiography, pelvimetry, placentography, location of foreign bodies of the eye, angiography, O.R. techniques, oral procedures, stereoscopy, pediatric angiographic procedures, etc. Prerequisite: Rad 61, 71.

98 **Therapy Procedures** (1) **Staff**

Introduction to radiation therapy and radium implants. Related anatomy, physiology, and pathology of phosphorous–32 and iodine–131 therapies and the technologist's responsibilities concerning them.

99 **Survey of Radiation Therapy and Nuclear Medicine** (3) **Staff**

Principles and practices of X-ray therapy and nuclear medicine techniques; purpose of radiation therapy and radioisotopes, their application, uses, types of equipment, and design. Prerequisite: Rad 51, 61, 71, 95, 96.

140 **Radiology Administration** (4) **Staff**

Instruction in the key areas of administration; human skills, technical skills, and conceptual awareness as they pertain to radiologic management at the department level. Traditional management concepts and models developed through modern texts and current journals which address the topics of organizational behavior, planning, controlling, etc. Discussion and exploration of the logistics of managing a radiology section. Prerequisite: HCA 135, 142, 153, 156.

145 **Administrative Project: Diagnostic Radiology** (3) **Staff**

For students concentrating in diagnostic radiology. Students identify, develop, and complete a project for a radiology department using administrative principles. Prerequisite: Rad 140.

147 **Administrative Project: Nuclear Medicine** (3) **Staff**

For students concentrating in nuclear medicine. Students identify, develop, and complete a project for a nuclear medicine department using administrative principles. Prerequisite: Rad 140.

149 **Administrative Project: Radiation Therapy** (3) **Staff**

For students concentrating in radiation therapy. Students identify, develop, and complete a project for a radiation therapy department using administrative principles. Prerequisite: Rad 140.

150 **Radiology Senior Study** (2) **Staff**

Independent study for radiologic sciences and administration. Faculty adviser acts as consultant to projects and gives minimal guidance. Project reports must be submitted for evaluation.

167 **Radiation Physics and Safety I** (3) **Staff**

Concepts of matter and energy and electromagnetic radiation. Mechanisms in the production of X-rays, X-ray circuits, including half-wave and full-wave rectification and 3-phase generators. Interaction of radiation with matter, emphasizing the photoelectric, Compton, and pair-production effect. Radiation detection and dosimetry, Roentgen rad and rem units of radiation. Radiation safety as applied to diagnostic radiology, nuclear medicine, and radiotherapy, including effects of time, distance, and shielding. Maximum permissible concentrations, internal dose problems.

171 **Radiological Electronics and Engineering** (3)

Introductory course designed to provide the student with an under ing of basic electronics as well as the operation, limitation, use and ciples in the selection of instrumentation. Transistors, power sup amplifiers, as well as major circuit components of radiation detecto struments, gamma camera and rectilinear scanners, radiotherapy voltage and linear accelerators, and diagnostic radiography equip

175 **Physics of Radiological Imaging** (3)

For students concentrating in diagnostic radiology. Image formatio transmission through radiological and related photo-optical devices, ing system analysis techniques. Concepts of sensitivity, contrast, modulation transfer functions. Description and analysis of photo re tors, including film grids and Bucky and intensifier screens. Radiogr development process. Fluoroscopy, cine radiography, and video t niques; image storage electronic radiography; and solid state imag panels. Ultra sonography and thermography. Demonstrations and periments in control and evaluation of radiologic imaging. Prerequi Rad 167, 168.

176 **Physics of Nuclear Medicine** (3)

For students concentrating in nuclear medicine. Concepts of radioacti including beta decay, isomeric transitions, electron capture, internal c sition, alpha decay, and the auger effect. Isotopic half-life secular transient equilibrium. Artificial transmutations, nuclear reactions, co ing statistics, and selection of instrumentation. Scintillation spectrom techniques. Rectilinear scanners, gamma camera, and computer technol in nuclear medicine. Demonstrations and experiments in control evaluation of imaging. Prerequisite: Rad 167, 168.

177 **Dosimetry in Radiation Therapy** (3)

For students concentrating in radiotherapy. Concepts of depth do isodose curves, and tissue air ratios for different energies, TSD, and fi size. Techniques of treatment planning for stationary, multiple, and m ing portals for Co-60 and megavoltage linear accelerators. Concepts wedge fields and compensation for multiple TSD surfaces and tissue homogenities. Dosimetry of linear sources. Quimby and Paterson Par dosimetry systems. Computer techniques in radiotherapy. Introduction the dosimetry of electrons, neutrons, and the heavy particles. Demonst tions and experiments illustrating dosimetric principles. Prerequis Rad 167, 168.

190 **Radiobiology** (3)

Advanced course involving biological aspects of radiation. Chemic physical, and genetic effects of radiation on cells and organisms. Rad ecology, safety and health. Legal aspects of control. Prerequisite: B 93 or 96.

195 **Directed Study in Radiation Physics** (2)

Projects in selected specialty demonstrating applications of radiati physics, imaging or dosimetric principles to radiographic quality contr and evaluation of radiological equipment systems. Prerequisite: Rad 1 171; 175 or 176 or 177.

383 **Clinical Radiology** — Wyman and Staff

Radiologic differential diagnosis; emphasis on the role of diagnostic radiology in clinical problem-solving. Each student is assigned a patient population and correlates the radiologic examinations with the clinical manifestations of disease. The student prepares a brief clinical and radiological summary and participates in procedures, case conferences with staff members, and interaction with medical and surgical staff members. Daily lectures and staff conferences. Audio-visual self-instructing material. 4-week elective periods. Univ. Hosp.

384 **Diagnostic Radiology** — Burwell and Staff

Participation in general radiography, fluoroscopy, and special procedures; interpretation of radiologic procedures with staff; review and study of teaching film file. Attendance at medical, surgical, and pediatric staff conferences. 4-week elective periods. Fairfax Hosp.

385 **Nuclear Medicine** — Varma, Reba, and Staff

Introduction to the physics of radioisotopes, radiochemistry, radiation detection, and instrumentation. Theory and operation of the nuclear camera and scanner. Study of organ imaging techniques, by lectures, conferences, and participation in patient care. Introduction to radio-immune assay. Correlation between clinical problems and nuclear diagnosis. 4-week elective periods. Univ. Hosp. and Wash. Hosp. Center

386 **Radiation Therapy** — Maier and Staff

Introduction to radiotherapeutic techniques, physics of high-energy radiation and instrumentation. Radiation treatment and correlated management of malignant diseases; emphasis on decision-making in a clinical practice. 4-week elective periods. Univ. Hosp.

387 **Subspecialty Diagnostic Radiology** — Staff

Subspecialty offerings include pulmonary, gastrointestinal, urologic, obstetric and gynecologic, neurologic, and pediatric. 4-week elective periods. Univ. Hosp.

388 **Diagnostic Radiology** — Reeder and Staff

Participation in general radiography, fluoroscopy, and special procedures; interpretation of radiologic procedures with staff; review and study of teaching film file; conferences. 4-week elective periods. Walter Reed Gen. Hosp.

389 **Diagnostic Radiology** — Ochs and Staff

Same as Rad 388. 4-week elective periods. Nat'l. Naval Med. Center

390 **Extramural Radiology Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

391 **Diagnostic Radiology** — Schumacher and Staff

Same as Rad 388. 4-week elective periods. Wash. Hosp. Center

Surgery

Chairman: P.C. Adkins

Directors of Divisions: P.C. Adkins *(General Surgery, Thoracic and Cardi*
cular Surgery), R.D. Shapiro *(Oral Surgery),* J.G. Randolph *(Pediatric*
gery), L.W. Thompson *(Plastic Surgery)*

Professors C.T. Klopp, G.S. Letterman *(Plastic),* J.G. Randolph, P.C. Ad
M. Mills, F.W. Plugge IV, J.E. McClenathan, W.J. Fouty

Clinical Professors V.M. Iovine, G.A. Higgins, Jr., E.A. Gould, J.R. Th
thwaite

Associate Professors H.C. Pierpont, T.C. Alford, P.E. Shorb, Jr., N.T. T
garis, W.L. Joseph, L.W. Thompson, C.M. Herman, N.M. Rich, L.T. Bo
G. Klebanoff, R.P. Altman, C.B. Wright, W.C. Dempsey *(Plastic)*

Associate Clinical Professors M.A. Schurter, N.P.D. Smyth, L. Gerber, D
Glew, Jr., D. Wenger, R.W. Parsons, J.M. Keshishian, N.H. Isaacson, A
Absolon, W.D. Latham

Associate Professorial Lecturer L.E. Church *(Oral)*

Assistant Professors A.J. Slovin, K.D. Anderson, D.W. Oller, F.M. Midg
P. Zamick *(Plastic),* G.W. Geelhoed, M.H. Jordan, Sr., B.L. Aaron, D. Bu
W. Gee, L.E. Smith, H.A. Steimel, R.C. Cochran

Assistant Clinical Professors W. Ferguson, J.J. Weinstein, F.B. Brandt, J.
Canter, J.B. Harrell, L.R. Perna, S.M. Kirson, F. Sacasa *(Oral),* R.D. Shap
(Oral), J.D. Alford, C.A. Silva, R.L. Flax, R.R. Cameron, H.F. Sears II, J.
Giordano, G.B. Helfrich, B.S. Teunis, R.C. Shaw, S.M. Knoll, E.M. Nathe
L.W. Gray, Jr., P.S. Fox, P.L. DeWitt, J.M. Garcia

Clinical Instructors J.H. Sager, S. Holen *(Periodontics),* R.S. Siegel *(Ora*
C.L. Magassy *(Plastic),* R.N. Scott

Special Lecturer J.H. Bayly

302 Clinical Clerkship in Plastic Surgery Staff
2-week elective periods. Univ. Hosp.

***303 Clinical Clerkship** Staff
12 weeks at Univ. Hosp. and Nat'l. Naval Med. Center

376 Advanced Surgery Staff
Participation in total patient care, including operative procedures under close supervision. 4-week elective periods. Andrews AFB Hosp., Nat'l. Naval Med. Center, Univ. Hosp., V.A. Hosp., Wash. Hosp. Center, Walter Reed Gen. Hosp.

378 Intensive Care Unit Absolon and Staff
Introduction to the management of acutely ill surgical patients, including cases involving trauma; neurosurgery; and cardiovascular-thoracic, abdominal, and orthopaedic surgery. 4-week elective periods. Wash. Hosp. Center

* Required for medical students.

379 **Transplantation Immunology**

Clinical renal transplantation and preservation. Daily teaching rounds, literature conference, seminar presentation, weekly surgical-medical nephrology rounds. 4-week elective periods. Wash. Hosp. Center

384 **Thoracic-Cardiovascular Surgery** **Adkins**

Study of the basic principles used in thoracic and cardiovascular surgery. 4-week elective periods. Univ. Hosp. and Clinic

385 **Plastic Head and Neck Surgery** Thompson

Participation in all activities, including preoperative and postoperative care, operating room procedures, clinical activities, conferences. Aesthetic surgery, head and neck cancer, maxillofacial trauma, hand surgery, congenital anomalies about the head and neck, and burns. 4-week elective periods. Univ. Hosp. and Clinic

386 **Pediatric Surgery** Randolph

Participation in an active, closely supervised surgical service for infants and children, including congenital defects, cardiac surgery, trauma, and neoplasms. 4-week elective periods. Children's Hosp.

387 **Plastic Head and Neck Surgery** Thompson, Parsons

Experience comparable to a surgical internship with integral participation in all activities of the service, including preoperative and postoperative care, operating room procedures, outpatient clinics, and conferences. Basic principles of wounds and their management, aesthetic and reconstructive surgery, and congenital anomalies. 4-week elective periods. Walter Reed Gen. Hosp.

388 **Plastic Surgery** **Staff**

Participation in an active plastic surgery service, principally aesthetic surgery, but also including other types of plastic surgery. Participation in out-patient clinics, operating room procedures, and conferences. 4-week elective periods. Nat'l. Naval Med. Center.

389 **Surgical Preceptorship** Iovine, McCune, Thistlethwaite, Isaacson

Participation in the care of general surgical patients as seen in private practice. 4-week elective periods.

390 **Extramural Surgery Elective** (arr.)

The department arranges for students to spend one or more elective periods at other institutions. Students must have the approval of the chairman of the department.

392 **Peripheral Vascular Surgery** Keshishian, Smyth, Slovin

Study and application of vascular surgery. 4-week elective periods. Wash. Hosp. Center

395 **Experimental Surgery** Joseph, Geelhoed

Participation in existing research projects and experimental operative procedures; assigned reading. 4-week elective periods. Surgical Research Lab., Ross Hall.

Urology

Chairman: H.C. Miller, Jr.

Professors L.R. Culbertson, H.C. Miller, Jr.

Clinical Professors E.E. Ferguson, W.D. Jarman, F.J. Frensilli, F.T. Reuter

Associate Professor M. Edson

Associate Clinical Professors H.A. Goldberg, C. Rodriguez, J. Kenealy, B Mittemeyer

Assistant Professor H.S. Semerdjian

Assistant Clinical Professors G. Ottenberg, R.C. Rhame, G. Dudas, H.J. Klaf roth, R.E. Ware, W.L. Banfield III, I.S. Young, E.H. Soifer, I.J. Spen D.M. Seitzman, I. Shuman, D.T. Schwartz, F.B. Hendricks, H. Salcedo

Clinical Instructors B.O. Black, T.A. MacLean, E.G. Abramson, J.B. Alp stein, R.A. Roth, W.L. Glover Jr., S.O. Kazmi

302 **Clinical Clerkship in Urology** Sta

2-week elective periods. Univ. Hosp.

380 **Clinical Urology** Reute

Outpatient and diagnostic urology, cystoscopy and radiographic procedure 2-week elective periods. Univ. Hosp.

381 **Clinical Urology** Miller and Sta

Observation of urologic conditions and procedures for diagnosis and trea ment; radiologic and pathologic studies, endoscopy and surgery, collater reading, weekly staff conference. 2-week elective periods. Univ., V.A Hosps., Nat'l. Naval Med. Center, Walter Reed Army Medical Cente Children's Hosp.

382 **Clinical Urology** Hendricks and Sta

Observation of urologic conditions and procedures for diagnosis and trea ment, radiologic and pathologic studies, endoscopy and surgery, collater reading, weekly staff conference. 2-week elective periods. V.A. Hosp.

383 **Clinical Urology** Edso

Outpatient and diagnostic urology; cystoscopic and operative urology. 2- week elective periods. Nat'l. Naval Md. Center.

390 **Extramural Urology Elective** (arr.)

The Department arranges for students to spend elective periods in othe institutions. Interested students should contact the chairman of the de partment.

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES

Faculty and Staff of Instruction*

EMERITI

Theodore Judson Abernethy, *Professor Emeritus of Clinical Medicine*
B.S. 1925, Denison University; M.D. 1929, Johns Hopkins University

Errett Cyril Albritton, *Professor Emeritus of Physiology*
B.A. 1916, University of Missouri; M.D. 1921, Johns Hopkins University

Louis Katz Alpert, *Professor Emeritus of Medicine*
B.S. 1928, M.D. 1932, Yale University

Harry Ford Anderson, *Professor Emeritus of Dermatology and Syphilology*
M.D. 1924, University of Cincinnati

William Staton Anderson, *Professor Emeritus of Clinical Child Health and Development*
B.A. 1927, Duke University; M.D. 1931, Johns Hopkins University

Brian Brewer Blades, *Professor Emeritus of Surgery*
B.A. 1928, University of Kansas; M.D. 1932, Washington University

Walter Andrew Bloedorn, *Professor Emeritus of Medicine*
M.D. 1909, Creighton University; B.A. 1915, M.A. 1916, Sc.D. 1948, George Washington University

Thomas McPherson Brown, *Professor Emeritus of Medicine*
B.A. 1929, Swarthmore College; M.D. 1933, Johns Hopkins University

Dexter Means Bullard, *Professor Emeritus of Clinical Psychiatry*
Ph.B. 1920, Yale University; M.D. 1923, University of Pennsylvania

Paul Calabrisi, *Professor Emeritus of Anatomy*
B.A. 1931, Catholic University of America; M.A. 1940, George Washington University; Ph.D. (Cantab.) 1955, University of Cambridge

Frank Duncan Costenbader, *Professor Emeritus of Clinical Ophthalmology*
B.S. 1925, Hampden-Sydney College; M.D. 1929, University of Virginia

Jeremiah Keith Cromer, *Professor Emeritus of Clinical Obstetrics and Gynecology*
M.D. 1929, B.A. 1931, George Washington University

*The Faculty and Staff of Instruction listed here and at the head of each department is for the academic year 1975-76. Faculty and staff members who hold appointments in two or more departments have the department of primary responsibility listed first.

Henry Lauran Darner, *Professor Emeritus of Clinical Obstetrics and G*
cology
B.A. 1916, Western Maryland College; M.D. 1920, Johns Hopkins University

Paul Frederick Dickens, *Professor Emeritus of Clinical Medicine*
M.D. 1908, University of Nashville

Samuel Mayer Dodek, *Professor Emeritus of Clinical Obstetrics and Gynec*
B.A. 1923, George Washington University; M.D. 1927, Thomas Jefferson University; M.A
Case Western Reserve University

William Rankin Duryee, *Research Professor Emeritus of Pathology (Ex*
mental)
B.A. 1927, Ph.D. 1933, Yale University

James Albert Dusbabek, *Professor Emeritus of Clinical Obstetrics and G*
cology
M.D. 1934, George Washington University

Clayton Bernard Ethridge, *Professor Emeritus of Medicine*
M.D. 1933, University of Virginia

Clarence Kendall Fraser, *Professor Emeritus of Clinical Obstetrics and G*
cology
Ph.B. 1931, College of the Holy Cross; M.D. 1935, Tufts University

James Quincy Gant, Jr., *Professor Emeritus of Clinical Dermatology*
B.A. 1930, M.S. 1931, Ohio State University; M.D. 1935, Medical College of Virgin
Virginia Commonwealth University

Robert Henry Groh, *Professor Emeritus of Clinical Neurology*
B.S. 1935, M.D. 1937, University of Pittsburgh

Robert Sexton Higdon, *Professor Emeritus of Dermatology (In Residenc*
B.S. 1933, Millsaps College; M.D. 1937, Tulane University

Alec Horwitz, *Professor Emeritus of Clinical Surgery*
B.A. 1920, M.D. 1923, George Washington University; M.S. in Surg. 1927, University of M
nesota

Hayden Kirby-Smith, *Professor Emeritus of Clinical Dermatology*
B.S. 1927, University of the South; M.D. 1937, George Washington University

Chester Elwood Leese, *Professor Emeritus of Physiology*
B.A. 1922, M.A. 1925, Ph.D. 1930, University of Iowa

Edward Lewis, *Professor Emeritus of Clinical Pediatrics*
M.D. 1918, George Washington University

Reginald Spencer Lourie, *Professor Emeritus of Child Health and Developme*
and of Psychiatry and Behavioral Sciences
B.S. 1930, Cornell University; M.D. 1936, State University of New York Downstate Med
Center; Med.Sc.D. 1941, Columbia University

Preston Alexander McLendon, *Professor Emeritus of Pediatrics*
B.S. 1913, Wake Forest University; M.D. 1915, Columbia University

Daniel Bruce Moffett, *Professor Emeritus of Otolaryngology*
B.A. 1910, University of Richmond; M.D. 1915, University of Maryland

Joseph Ney, *Professor Emeritus of Clinical Medicine*
B.S. 1931, University of Virginia; M.D. 1935, Harvard University

Margaret Mary Nicholson, *Professor Emeritus of Clinical Pediatrics*
B.A. 1922, M.D. 1925, George Washington University

George Nordlinger, *Professor Emeritus of Clinical Obstetrics and Gynecology*
B.A. 1918, M.D. 1922, George Washington University

Thomas Martin Peery, *Professor Emeritus of Pathology*
B.A. 1928, D.M.S. 1966, Newberry College; M.D. 1932, Medical University of South Caro

Lois Irene Platt, *Associate Professor Emeritus of Pathology*
B.A. 1931, Goucher College; M.D. 1946, University of Maryland

Herbert Pollack, *Professor Emeritus of Clinical Medicine (Biochemistry)*
B.A. 1925, Washington and Lee University; M.D. 1929, Cornell University; Ph.D. 1933, University of Minnesota

Andrew Gabriel Prandoni, *Professor Emeritus of Clinical Medicine*
B.S. 1934, Fordham University; M.D. 1938, State University of New York Downstate Medical Center

Lawrence Elias Putnam, *Professor Emeritus of Clinical Medicine*
B.A. 1930, M.D. 1934, Harvard University

Benjamin Rones, *Professor Emeritus of Clinical Ophthalmology*
B.A. 1922, M.D. 1926, Johns Hopkins University

Ernest Alfred Watson Sheppard, *Professor Emeritus of Clinical Ophthalmology*
M.D., C.M. 1926, Queens University, Canada

Donald Harrison Stubbs, *Professor Emeritus of Clinical Anesthesiology*
B.A. 1929, M.A. 1931, M.D. 1932, George Washington University

Ira Rockwood Telford, *Professor Emeritus of Anatomy*
B.A. 1931, M.A. 1933, University of Utah; Ph.D. 1942, George Washington University

Thomas Carlton Thompson, *Professor Emeritus of Clinical Urology*
B.S. in Med., M.D. 1920, George Washington University

Janet Graeme Travell, *Professor Emeritus of Clinical Medicine*
B.A. 1922, Wellesley College; M.D. 1926, Cornell University

John Augustine Washington, *Professor Emeritus of Clinical Child Health and Development*
B.A. 1924, Virginia Military Institute; B.S. 1926, University of Virginia; M.D. 1930, Johns Hopkins University

James Winston Watts, *Professor Emeritus of Neurological Surgery*
B.S. 1924, Virginia Military Institute; M.D. 1928, University of Virginia

Richard Wallace Wilkinson, *Professor Emeritus of Clinical Ophthalmology*
B.A. 1925, M.D. 1928, George Washington University; M.S. in Med. 1932, University of Pennsylvania

ACTIVE

Benjamin Larry Aaron, *Assistant Professor of Surgery*
B.A. 1954, University of Missouri; M.D. 1958, University of Texas Medical Branch at Galveston

Abe Samuel Abraham, *Associate Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1938, Westminster College, Pennsylvania; M.D. 1950, George Washington University

Kristof Abraham, *Associate Clinical Professor of Neurology*
M.D. 1952, Budapest University

Edward Gerald Abramson, *Clinical Instructor in Urology*
B.A. 1962, University of Pennsylvania; M.D. 1967, University of Virginia

Fred Paul Abramson, *Associate Professor of Pharmacology and of Pathology*
B.A. 1962, Case Western Reserve University; Ph.D. 1965, Ohio State University

Karel Bedrich Absolon, *Associate Clinical Professor of Surgery*
M.B. 1948, Masaryck University, Czechoslovakia; M.D. 1952, Yale University; M.S., Ph.D. 1963, University of Minnesota

R. Marshall Ackerman, *Clinical Instructor in Orthopaedic Surgery*
B.S. 1958, M.D. 1962, University of Pittsburgh

John Pletch Adams, *Professor of Orthopaedic Surgery and of Child Health a Development*
B.S. 1943, University of Missouri; M.D. 1945, Washington University

Ann Evelyn Baryshyan Adcook, *Clinical Instructor in Pathology (Laborat Medicine)*
B.S. 1968, Marywood College

Edward Adelson, *Associate Clinical Professor of Medicine*
B.S. 1943, M.D. 1947, Tufts University

Paul Charles Adkins, *Lewis Saltz Professor of Surgery*
B.A. 1944, M.D. 1948, Johns Hopkins University

Mohan Teckchand Advani, *Assistant Clinical Professor of Psychiatry and B havioral Sciences*
B.S. 1955, Punjab University, India; M.B., B.S. 1960, Osmani University, India; D.P.M. 19 Mysore University, India

Lewis Francis Affronti, *Professor of Microbiology*
B.A. 1950, M.A. 1951, State University of New York at Buffalo; Ph.D. 1958, Duke Univers

Cosimo Ajmone-Marsan, *Associate Clinical Professor of Neurology*
M.D. 1942, University of Torino, Italy

Flavius Abiola Akerele, *Clinical Instructor in Obstetrics and Gynecology*
B.A. 1966, Boston University; M.D. 1970, George Washington University

Julio Estuardo Alarcon, *Clinical Instructor in Obstetrics and Gynecology*
M.D. 1966, University of Trujillo, Peru

Chalom Albert, *Assistant Clinical Professor of Anesthesiology*
B.A. 1949, M.D. 1953, American University of Beirut

Dan George Albert, *Assistant Clinical Professor of Ophthalmology and of Chil Health and Development*
B.S. 1938, Ohio State University; M.D. 1950, State University of New York Upstate Medica Center

Ernest Narinder Albert, *Associate Professor of Anatomy*
B.S. 1959, High Point College; M.S. 1963, University of Pittsburgh; Ph.D. 1965, Georgetown University

Solomon Naphtali Albert, *Associate Clinical Professor of Anesthesiology*
B.A. 1936, M.D. 1940, American University of Beirut

Yousef Al-Doory, *Associate Professor of Pathology (Laboratory Medicine)*
B.S. 1945, University of Baghdad; M.A. 1951, University of Texas; Ph.D. 1954, Louisiana State University

Stewart Leonard Aledort, *Special Lecturer in Psychiatry and Behavioral Sc ences*
B.S. 1958, City University of New York, Queens College; M.S. 1960, University of Connecticut M.D. 1964, Yeshiva University

James David Alford, *Assistant Clinical Professor of Surgery*
B.A. 1959, M.D. 1966, University of North Carolina

Theodore Crandall Alford, *Associate Professor of Surgery*
B.A. 1944, Haverford College; M.D. 1947, Johns Hopkins University

Frank Duane Allan, *Professor of Anatomy*
B.S. 1947, M.S. 1949, University of Utah; Ph.D. 1954, Louisiana State University

Melvin Gustavus Alper, *Clinical Professor of Ophthalmology*
B.A. 1943, M.D. 1945, University of Virginia

Joel Barry Alperstein, *Clinical Instructor in Urology*
B.S. 1961, M.D. 1967, University of Maryland

Hubert Joseph Alpert, *Clinical Instructor in Medicine*
M.D. 1962, University of Illinois at the Medical Center

Seymour Alpert, *Professor of Anesthesiology; Vice President of the University, for Development*
B.A. 1939, Columbia University; M.D. 1943, State University of New York Downstate Medical Center

Roy Peter Altman, *Associate Professor of Surgery and of Child Health and Development*
B.A. 1955, Colgate University; M.S. 1958, University of Rochester; M.D. 1961, New York Medical College

Stuart Harold Altman, *Professorial Lecturer in Health Care Sciences*
M.A. 1961, Ph.D. 1964, University of California, Los Angeles

Alice Hackney Altstatt, *Associate Professor of Anesthesiology*
B.A. 1969, Bryn Mawr College; M.A. 1952, M.D. 1956, Vanderbilt University

Antonina Neri Amigable, *Assistant Professor of Medicine*
M.D. 1966, Cebu Institute of Technology, Philippines

Sirus Amiri, *Clinical Instructor in Child Health and Development*
M.D. 1956, University of Tehran

Harvey Hirsch Ammerman, *Clinical Professor of Neurological Surgery*
B.S. 1939, M.D. 1943, George Washington University

Richard Gene Ammerman, *Clinical Instructor in Psychiatry and Behavioral Sciences*
B.A. 1964, Yale University; M.D. 1968, Tufts University

Arthur James Anderson, *Assistant Clinical Professor of Medicine*
M.D. 1961, George Washington University

Elizabeth Potts Anderson, *Professorial Lecturer in Biochemistry*
B.A. 1945, Sarah Lawrence College; M.S. 1947, University of Wisconsin; Ph.D. 1950, Stanford University

James Edward Anderson, *Clinical Instructor in Obstetrics and Gynecology*
B.A. 1955, Union College, Nebraska; M.D. 1965, Loma Linda University

Kathryn Duncan Anderson, *Assistant Professor of Surgery and of Child Health and Development*
B.A. 1961, M.A. 1964, University of Cambridge; M.D. 1964, Harvard University

Seawright Wilbur Anderson, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
M.D. 1950, Howard University

Seth Eli Anderson, Jr., *Assistant Professor of Medicine*
B.A. 1959, Pacific Lutheran College; M.D. 1963, University of Washington

J. Robert Andrews, *Professorial Lecturer in Radiology*
Ph.B. 1928, Brown University; M.D. 1932, Case Western Reserve University; D.Sc. 1946, University of Pennsylvania

Jack William Andrews, *Special Lecturer in Radiology*

John Lawrence Angel, *Professorial Lecturer in Anatomy and Anthropology*
B.A. 1936, Ph.D. 1942, Harvard University

Tatiana Antonovych, *Professorial Lecturer in Pathology*
M.D. 1941, University of Vienna

Leonard Philip Appel, *Clinical Instructor in Medicine*
B.A. 1953, M.D. 1957, New York University

Irwin Ardam, *Assistant Clinical Professor of Medicine*
B.A. 1948, New York University; M.D. 1954, New York Medical College

John William Argent, Jr., *Special Lecturer in Health Care Sciences*

Victor Arturo Argumedo, *Assistant Professor of Anesthesiology and of Child Health and Development*
M.B., B.S. 1966, University of San Marcos, Peru

Bryan Arling, *Assistant Professor of Medicine*
B.A. 1965, University of Minnesota; M.D. 1969, Harvard University

Mansour Farid Armaly, *Professor of Ophthalmology*
B.A. 1947, M.D. 1952, American University of Beirut; M.S. 1957, University of Iowa

Malcolm Stewart Artenstein, *Clinical Professor of Medicine*
B.A. 1951, Brown University; M.D. 1955, Tufts University

James Hiram Arthmann, *Special Lecturer in Radiology*

Philip Assatourians, *Assistant Clinical Professor of Medicine*
M.D. 1964, University of Tehran

Abdelfattah Mohamed Attallah, *Research Instructor in Child Health and Development*
B.S. 1967, Alexandria University; D.E.A. 1971, University of Paris; Ph.D. 1974, George Washington University

Frank Herbert Attix, *Associate Research Professor of Radiology (Radiation Physics)*
B.A. 1949, University of California, Berkeley; M.S. 1953, University of Maryland

Gilbert Paul August, *Associate Professor of Child Health and Development*
B.S. 1958, City University of New York, City College; M.D. 1962, New York University

Gunter Josef Augustin, *Associate Clinical Professor of Radiology*
M.D. 1952, University of Heidelberg

Rosalie Meissner Auster, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
B.A. 1961, University of Connecticut; M.D. 1965, Boston University

Simon Leo Auster, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
B.A. 1952, Yeshiva University; M.D. 1956, New York University

Gordon Avery, *Professor of Child Health and Development*
B.A. 1953, Harvard University; M.D. 1958, Ph.D. 1959, University of Pennsylvania

Julius Axelrod, *Distinguished Professor of Science; Professorial Lecturer in Pharmacology*
B.S. 1933, City University of New York, City College; M.A. 1941, New York University; Ph.D. 1955, LL.D. 1971, George Washington University; Sc.D. 1966, University of Chicago

Silas Babin, Jr., *Assistant Clinical Professor of Medicine*
M.D. 1951, Louisiana State University, New Orleans

John Christopher Babka, *Assistant Professor of Medicine*
B.S. 1965, Ohio University; M.D. 1968, Ohio State University

James Michael Bacos, *Professor of Medicine*
B.S. 1948, Virginia Polytechnic Institute and State University; M.D. 1953, Duke University

Robert Emil Badwey, *Clinical Instructor in Obstetrics and Gynecology*
B.S. 1955, Franklin and Marshall College; M.D. 1959, University of Pittsburgh

Alfred Baer, *Associate Clinical Professor of Medicine*
B.A. 1942, Ohio State University; M.D. 1945, Johns Hopkins University

William Eldridge Bageant, *Assistant Clinical Professor of Anesthesiology*
M.D. 1939, George Washington University

David Whitney Bailey, *Associate Professor of Child Health and Development*
B.A. 1954, Bowdoin College; M.D., C.M. 1958, McGill University

George William Bailey, *Assistant Professor of Health Care Sciences and of Child Health and Development*
B.A. 1963, Birmingham-Southern College; M.D. 1967, University of Alabama in Birmingham

John Martyn Bailey, *Professor of Biochemistry*
B.S. 1949, Ph.D. 1952, D.Sc. 1970, University of Wales

William Otis Bailey, Jr., *Associate Clinical Professor of Medicine*
M.D. 1940, George Washington University

George Ivan Baker, *Assistant Clinical Professor of Orthopaedic Surgery*
B.A. 1950, Syracuse University; M.D. 1954, State University of New York Upstate Medical Center

Joseph Baker, *Associate Clinical Professor of Psychiatry and Behavioral Sciences*
B.A. 1940, Sc.D. 1970, Gettysburg College; M.D. 1944, Temple University

Roger Denio Baker, *Professorial Lecturer in Pathology*
B.A. 1924, University of Wisconsin; M.D. 1928, Harvard University

Stewart Lee Baker, Jr., *Clinical Professor of Psychiatry and Behavioral Sciences and of Child Health and Development*
B.S. 1942, University of Maryland; M.D. 1945, George Washington University

William Prentice Baker, *Professor of Medicine*
B.S. 1949, Indiana University; M.S. 1953, Ph.D. 1955, Michigan State University; M.D. 1959, University of Michigan

Guillermo Alfredo Balfour, *Assistant Clinical Professor of Child Health and Development*
M.D. 1959, University of Buenos Aires

Giuseppe Balsamo, *Assistant Clinical Professor of Medicine*
Laurea in Medicinae Chirurgia 1952, University of Rome

Bernard Alvin Band, *Clinical Instructor in Obstetrics and Gynecology*
B.A. 1952, B.S. 1954, George Washington University; M.D. 1959, Howard University

William Landon Banfield III, *Assistant Clinical Professor of Urology*
B.A. 1954, Princeton University; M.D. 1958, George Washington University

Llewellys Franklin Barker, *Assistant Clinical Professor of Medicine*
B.A. 1955, Princeton University; M.D. 1959, Johns Hopkins University

Ann Birnbaum Barnet, *Associate Professor of Neurology and of Child Health and Development*
B.A. 1951, Sarah Lawrence College; M.D. 1956, Harvard University

Kenneth Brian Barr, *Assistant Clinical Professor of Pathology (Laboratory Medicine)*
B.A. 1964, Adams State College

Norman Lee Barr, Jr., *Clinical Instructor in Otolaryngology*
B.A. 1959, Princeton University; M.D. 1965, Georgetown University

Solomon Efrem Barr, *Assistant Clinical Professor of Medicine*
B.A. 1951, M.D. 1954, George Washington University

John William Barrett, *Assistant Clinical Professor of Neurological Surgery*
M.D. 1958, George Washington University

Robert Henry Barter, *Professor of Obstetrics and Gynecology*
B.S. 1937, M.D. 1940, University of Wisconsin

Werner Franklin Barth, *Professor of Medicine*
B.A. 1956, Columbia University; M.D. 1960, Yeshiva University

Ramez Bassir, *Assistant Professor of Clinical Engineering*
M.D. 1969, Nagoya University, Japan

Constance Urciolo Battle, *Associate Professor of Child Health and Development*
B.A. 1963, Trinity College, District of Columbia; M.D. 1967, George Washington University

Marianne Bayley, *Clinical Instructor in Pathology (Laboratory Medicine)*
B.S. 1963, University of Vermont; M.S. 1974, University of Maryland

John Henry Bayly, *Special Lecturer in Surgery and in Child Health and Development*
B.S. 1936, Rensselaer Polytechnic Institute; M.D. 1940, Georgetown University

Mary Garven Beale, *Instructor in Child Health and Development*
B.A. 1966, Wellesley College; M.D. 1970, Johns Hopkins University

Lillian McLean Beard, *Clinical Instructor in Child Health and Development*
B.S. 1965, M.D. 1970, Howard University

Harry Carl Beaver, *Clinical Instructor in Obstetrics and Gynecology*
B.S. 1959, Wheaton College, Illinois; M.D. 1963, George Washington University

Rebecca Mae Styrlund Beck, *Instructor in Radiology (Radiologic Technology)*
B.S. 1974, University of Minnesota

Arthur Abbe Becker, *Assistant Clinical Professor of Obstetrics and Gynecology*
B.S. 1956, City University of New York, City College; M.D. 1961, University of Iowa

Kenneth Louis Becker, *Professor of Medicine*
B.A. 1952, University of Michigan; M.D. 1956, New York Medical College; Ph.D. 1963, University of Minnesota

Samuel Michael Belinsky, *Associate Clinical Professor of Obstetrics and Gynecology*
B.A. 1955, University of Bridgeport; M.D. 1959, George Washington University

Ruth Boschwitz Benedict, *Associate Clinical Professor of Medicine*
B.A. 1935, Wellesley College; M.D. 1939, New York University

Robert Allen Berenson, *Clinical Instructor in Health Care Sciences*
B.A. 1968, Brandeis University; M.M.S. 1970, Rutgers—The State University; M.D. 1972, University of New York, Mount Sinai School of Medicine

Sanders Harris Berk, *Assistant Professor of Dermatology*
B.S. 1965, M.D. 1969, University of Maryland

Peter Morris Berkman, *Assistant Professor of Medicine*
B.A. 1955, Harvard University; M.D. 1959, Columbia University

David Kip Berler, *Assistant Clinical Professor of Ophthalmology*
B.A. 1955, M.D. 1958, Cornell University

Cheston Milton Berlin, Jr., *Special Lecturer in Child Health and Development*
B.A. 1958, Haverford College; M.D. 1962, Harvard University

Howard Hillel Berman, *Assistant Clinical Professor of Pathology*
B.A. 1958, Duke University; M.D. 1962, Columbia University

Sidney Berman, *Clinical Professor of Psychiatry and Behavioral Sciences and of Child Health and Development*
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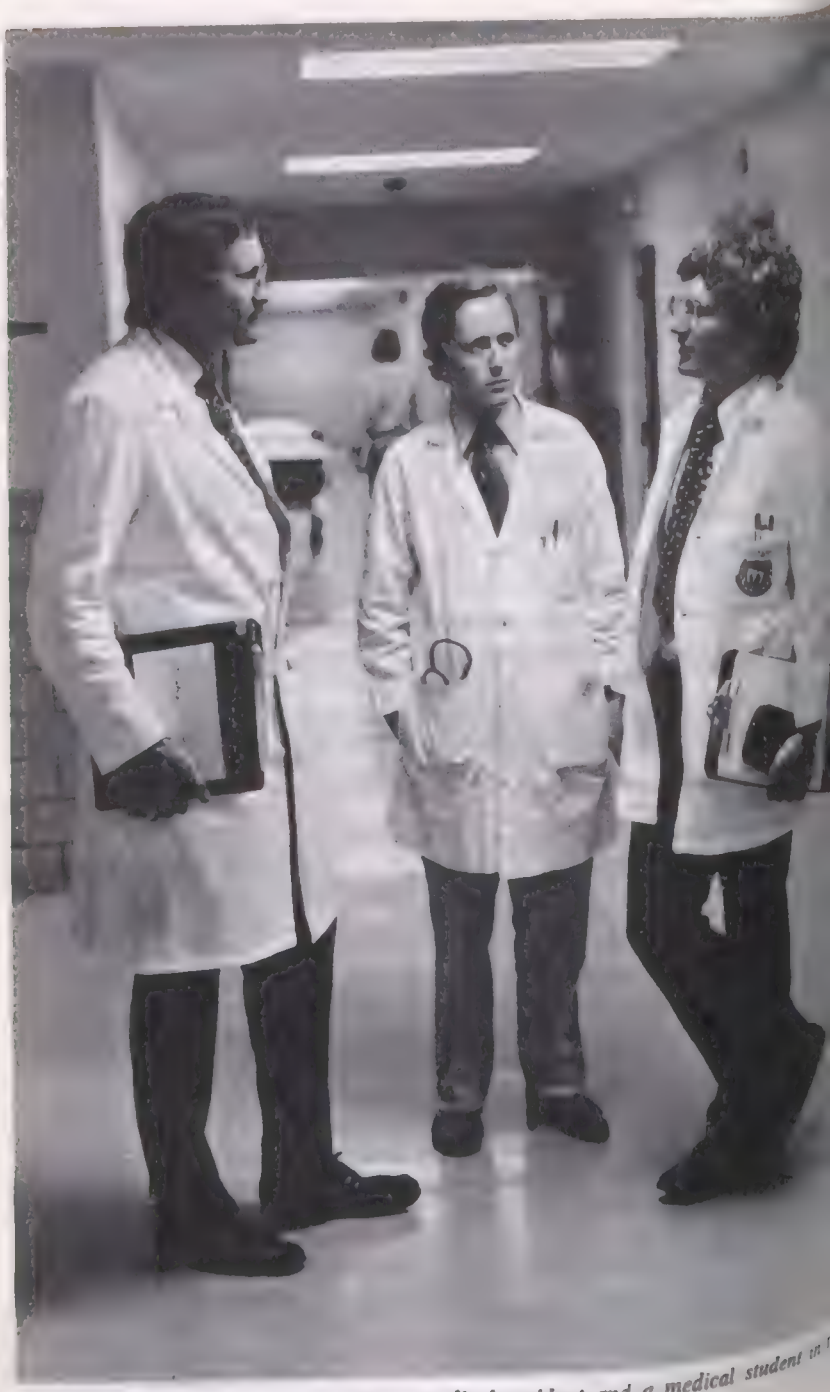
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An internist discusses a case with a medical resident and a medical student in University Hospital.

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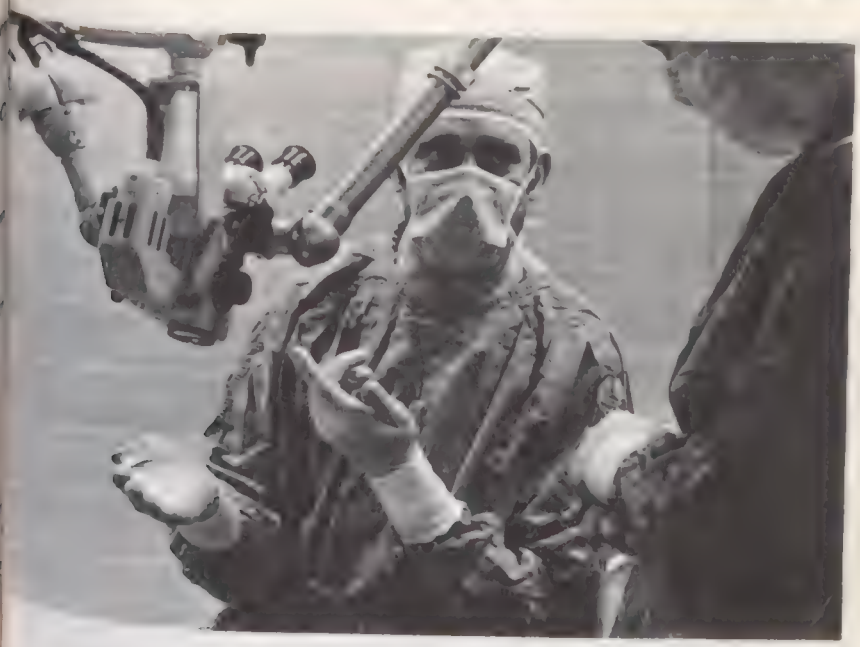
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B.S. 1975, University of North Dakota

Myerson, Ross
B.A. 1972, Washington University

NaPier, Bradford
B.A. 1975, University of the Pacific

Nichols, Glenn
B.A. 1974, Gettysburg College

Parker, John
B.A. 1973, Williams College

Parkinson, Michael — Conn.
B.A. 1975, Cornell University

Parrott, Maureen — Md.
B.S. 1975, George Washington University

Perman, Kevin — N.Y.
B.S. 1973, City University of New York, Brooklyn College

Quint, Andrew — N.Y.
B.A. 1974, Oberlin College

Reif, Henry — Mass.
B.A. 1975, Amherst College

Reiley, Mark — Calif.
B.A. 1972, M.A. 1975, Claremont Men's College

Reznick, Steven — D.C.
B.S. 1975, University of Maryland

Roberts, William — D.C.
B.A. 1975, Princeton University

Rodriguez, Eric — Md.
M.H. 1973, Yale University
B.A. 1975, George Washington University

Roesler, Paul — Colo.
B.A. 1974, M.A. 1975, Stanford University

Rose, David — Calif.
B.A. 1975, University of California

Rothenberg, Peter — N.Y.
B.A. 1973, Colgate College

Rubin, Joshua — Pa.
B.A. 1974, University of Pennsylvania

Schaus, James — N.Y.
B.S. 1975, State University of New York at Stony Brook

Schoultz, Nils — Conn.
B.A. 1968, University of California, Santa Cruz; M.S.W. 1972, San Jose State University

Sciabbarrasi, Joseph — Md.
B.S. 1972, Georgetown University
M.S. 1975, George Washington University

Sege, Vivian — Md.
B.A. 1975, Brown University

Senft, Susan — Iowa
B.S. 1975, University of Dubuque

Shafer, Charles — Ga.
B.S. 1972, M.S. 1974, Georgia Institute of Technology

Shapiro, Gary — Mich.
B.S. 1976, Michigan State University

Siciliano, Donna — Va.
B.A. 1971, Ithaca College

Siddoway, Roger — Utah
B.A. 1974, University of Utah

Simms, Harry — N.Y.
B.A. 1975, Johns Hopkins University

Sisto, Domenick — N.J.
B.A. 1975, University of Vermont

Smith, Albert — Calif.
B.A. 1972, University of California, Berkeley

Snyder, Barbara — N.Y.
B.A. 1970, M.S. 1972, Columbia University

Spencer, Elizabeth — D.C.
B.A. 1973, Radcliffe College
M.A.T. 1974, George Washington University

Stackhouse, Charles — N.Y.
B.A. 1975, Princeton University

Stanley, Brian — Md.
B.S. 1972, University of Maryland
M.S. 1975, Massachusetts Institute of Technology

Strand, Brian — Wis.
B.S. 1974, University of Wisconsin

Stretch, Gwendolyn — D.C.
B.A. 1975, Bowdoin College

Taney, Barry — N.J.
B.S. 1975, Brown University

Taylor, Crystal — D.C.
B.A. 1973, Oberlin College

Test, Eric — Calif.
B.S. 1974, Stanford University

Tolbert, Alice — D.C.
B.A. 1975, Mt. Holyoke College

Toth, William — Va.
B.A. 1971, Ohio Wesleyan University
M.S. 1973, George Washington University

Treiser, Murray — Canada
B.S. 1975, McGill University

Weiss, Steven — Calif.
B.A. 1975, University of California, Los Angeles

Wetstone, Jeffrey — Conn.
B.A. 1975, Wesleyan University

Wright, Steven — Calif.
B.S. 1975, Brigham Young University

Wiley, Andrew — Pa.
B.S. 1969, Cornell University
M.S. 1970, Stanford University

Williams, John — D.C.
B.A. 1970, M.S. 1973, Boston University

Williams, Margo — N.Y.
B.A. 1969, Marquette University
M.A. 1975, City University of New York, Hunter College

Winnick, David — Conn.
B.A. 1975, Union College

Winship, Joseph — Calif.
B.S. 1974, University of California, Irvine

Wiseman, Jonathan — Md.
B.A. 1973, University of Wisconsin

Witte, Madolin — Md.
B.S. 1975, American University

Zaglin, Robert — S.C.
B.A. 1975, Yale University

Zagorzycki, Maria — N.J.
B.A. 1975, Cornell University

Second Year

Allen, Warren M. — Calif.
B.A. 1974, Swarthmore College

Allenby, Kent S. — Va.
B.A. 1973, Dartmouth College

Barton, Bette L. — Va.
B.A. 1958, Rutgers University
Ph.D. 1963, Columbia University

Basch, Peter — Conn.
B.A. 1974, Trinity College

Beckmann, Mary L. — Pa.
B.A. 1970, University of Rochester
M.S. 1974, University of Illinois

Benesh, Bruce L. — N.Y.
B.A. 1969, Adelphi University

Blackmon, Wayne — N.Y.
B.A. 1973, New York University

Blank, Karen — Vt.
B.A. 1972, M.A. 1973, Washington University

Blue, John, Jr. — N.C.
B.A. 1973, University of North Carolina at Chapel Hill

Blumenthal, Bruce A. — N.J.
B.A. 1974, Columbia University

Bober, John F. — Md.
B.A. 1974, Johns Hopkins University

Bohon, Constance J. — Mo.
B.A. 1974, Mount Holyoke College

Borodulia, Nicholas N. — Md.
B.S. 1974, George Washington University

Brennan, Bruce — N.Y.
B.A. 1974, Columbia University

Brooks, Dana B. — Calif.
B.A. 1971, Stanford University

Brown, Martin H. — N.Y.
B.S. 1974, George Washington University

Butler, Maurice — D.C.
B.S. 1974, Howard University

Byers, Robert H. — N.Y.
B.S. 1973, State University of New York at Stony Brook

Campbell, Alan D. — Mich.
B.A. 1974, University of Michigan

Cashell, Alan — D.C.
B.A. 1970, Dickinson College

Chang, Clayton W. — Hawaii
B.A. 1974, Columbia University

Cheatham, Carolyn L. — Conn.
B.A. 1971, Howard University

Chin, John — Calif.
B.A. 1973, University of California, Berkeley

Chin, Robert — D.C.
B.S. 1974, Dickinson College

Chopivsky, Peter — Ill.
B.A. 1974, Princeton University

Cohen, John B. — Va.
B.A. 1972, University of Pennsylvania

Cotter, James C. — Calif.
B.S. 1974, University of California, Los Angeles

Daniels, Marcia — Calif.
B.S. 1973, Trinity College

Davidson, Richard S. — Utah
B.S. 1974, Weber State College

Demberg, James H. — N.Y.
B.A. 1973, New York University

Dent, Dean A. — Md.
B.A. 1974, Brown University

Doppelheur, John D. — Ga.
B.A. 1974, George Washington University

Dunbar, Lala — Va.
B.S. 1954, Ph.D. 1972, George Washington University

Edelglass, John W. — Conn.
B.S. 1973, M.S. 1974, Tufts University

Ein, Thomas E. — N.J.
B.S. 1972, George Washington University
M.S. 1974, Georgetown University

Engstrom, Fayette — Ohio
B.A. 1968, University of Pennsylvania

Epstein, Paul M. — N.Y.
B.S. 1973, City University of New York, Brooklyn College

Evans, Geoffrey — Va.
B.A. 1973, University of Richmond

Feldman, Dennis H. — N.J.
B.A. 1974, Colgate University

Feller, Bruce S.
B.A. 1974, University of Rochester

Filak, Andrew T.
B.A. 1974, St. Peter's College

Frank, Dana H.
B.A. 1973, Brown University

Freer, Carol
B.S. 1968, University of Delaware

Frenkel, David S.
B.A. 1973, Washington University

Frey, Linda R.
B.A. 1969, Smith College
M.A. 1971, University of Wisconsin

Freidman, Roger J.
B.A. 1973, Washington University

Fuchs, Thomas D.
B.A. 1974, Duke University

Furlow, Jerilin
B.A. 1969, George Washington Univers

Galante, Ardelem
B.S. 1973, Tufts University

Geier, Mark R.
B.S. 1970, Ph.D. 1973, George Washi University

Gianfortoni, Joseph G.
B.A. 1973, Franklin and Marshall Colle

Goade, Gracia M.
B.A. 1970, University of Pennsylvania
M.S. 1972, Johns Hopkins University

Goodman, Amy S.
B.A. 1971, New York University

Goumas, William M.
B.A. 1973, Emory University

Greenstein, Masha E.
B.A. 1963, Antioch College
Ph.D. 1968, Yale University

Harper, Wayne L.
B.S. 1974, Duke University

Hoeck, Barbara E.
B.S. 1974, George Washington Universi

Hogan, Mary P.
B.A. 1974, George Washington Universi

Holzman, Robert S.
B.S. 1971, City University of New York

Horn, Carole E.
B.A. 1966, Brandeis University
M.A. 1969, Columbia University

Horn, Janet
B.A. 1972, Vanderbilt University
M.S. 1973, Georgetown University

Horwitz, Stuart L.
B.A. 1972, Colgate University

Jacobs, Howard S.
Attended George Washington University

Jensen, Peter S.
B.S. 1974, Brigham Young University

Kane, Elinoe
B.A., 1958, Wheaton College

Kaplan, Alan N.
B.A. 1971, George Washington University
M.A. 1974, Tufts University

Kaplan, Fred M.
B.A. 1974, Colgate University

Kendrick, Juliette S.
B.A. 1974, Wesleyan University, Conn.

Knight, Elizabeth A.
B.A. 1973, Mount Holyoke College

Kohanna, Fred
B.S. 1974, Columbia University

Kotzen, Jeffrey H.
B.S. 1974, George Washington University

Kovarick, Suzan
B.A. 1974, University of Vermont

Kranzler, Elliot M. Md.
B.A. 1973, Johns Hopkins University
Kravitz, Jack Fla.
Attended George Washington University
Lanzafame, Raymond J. N.Y.
B.S. 1974, Cornell University
Lee, John S. Md.
B.S. 1967, Yale University
Ph.D. 1973, George Washington University
Lesnin, Susan R. Fla.
B.A. 1974, Northwestern University
Levine, Laurence N.Y.
B.A. 1972, New York University
Lewis, Stuart A. N.Y.
B.S. 1974, Cornell University
Liang, Raymond Y. Pa.
B.A. 1972, University of Pennsylvania
Lin, Mini A. Calif.
B.A. 1971, Radcliffe College
Liggins, William F. Ohio
B.A. 1974, Miami University
Lorett, Jeffrey W. La.
B.S. 1971, Louisiana State University
M.S. 1973, Texas Graduate School of Bio-Medical Sciences
MacFarland, Linda C. Conn.
B.A. 1974, Connecticut College
Makinen, Lynn J. Wash.
B.S. 1974, University of Washington
Marano, Matthew J. N.J.
B.A. 1974, Columbia University
McGowan, Judson C. Ga.
B.S. 1969, University of Rochester
Michelstein, Richard D. N.Y.
B.A. 1974, University of Rochester
Moore, Robert C. N.H.
B.S. 1969, Trinity College
M.S. 1973, University of Minnesota
Morris, Howard G. Md.
B.A. 1974, Wake Forest College
Moshman, Gordon S. Colo.
B.A. 1974, University of Colorado
Muldrock, John D. N.J.
B.A. 1974, Rutgers University
Murray, Kevin M Calif.
B.A. 1974, Stanford University
Nierman, Richard A. N.J.
B.S. 1974, University of Michigan
Newman, Richard S. N.Y.
B.S. 1974, Tufts University
Owen, Kimball R. Utah
B.S. 1974, Brigham Young University
Ozzieff, Bruce Calif.
B.A. 1973, Amherst College
Petrone, Joseph J. N.Y.
B.A. 1971, Cornell University
Pickard, Jeffrey Mass.
B.A. 1974, Johns Hopkins University
Piperi, Vincent D N.J.
B.A. 1973, Seton Hall University
Powell, Blake L. Md.
B.S. 1973, George Washington University
Pulde, Milo F. Mass.
B.A. 1974, Tufts University
Rao, Robert P. Md.
B.A. 1973, Vanderbilt University
Riegel, Darrell S. Calif.
B.S. 1972, M.S. 1974, Massachusetts Institute of Technology
Rinaldi, Theodor D. N.Y.
B.A. 1973, Antioch College
Rizzoli, Paul B. Md.
B.A. 1974, Haverford College

Robinson, Lois Mass.
B.A. 1973, Stanford University
Rogal, Gary N.J.
B.S. 1974, George Washington University
Rogers, Clare R. N.Y.
B.A. 1969, Barnard College
Saidman, Sander B. D.C.
B.A. 1974, Washington University
Santos, Robert T. Calif.
B.A. 1973, University of California, Berkeley
Sarno, Robert A. Colo.
B.S. 1974, U.S. Air Force Academy
Savitsky, S. Mitchell N.Y.
B.A. 1973, Cornell University
Seidel, Eric C. Pa.
B.S. 1972, Albright College
M.S. 1973, Wayne State University
Seidman, Christine Wis.
B.S. 1974, Radcliffe College
Sheen, Michael R. Utah
B.S. 1974, Brigham Young University
Sherman, Orrin N.J.
B.A. 1974, University of Vermont
Shuman, Harry I. N.Y.
B.A. 1974, University of Rochester
Silver, Lee R. Calif.
B.S. 1970, M.S. 1974, Rhode Island University
Simons, Steven M. N.Y.
B.A. 1971, M.A. 1974, Wesleyan University, Conn.
Singer, Ira J. N.J.
B.S. 1974, George Washington University
Sloan, Dean D. Va.
B.A. 1972, Duke University
Smith, Roy A. N.Y.
B.S. 1974, City University of New York, Brooklyn College
Smith, Steven B. Utah
B.S. 1974, University of Utah
Solof, Robert, Sr. N.Y.
B.S. 1970, Purdue University
Stevens, David M. Md.
B.A. 1969, Washington University
M.S. 1974, George Washington University
Strauus, Steven C. Md.
B.A. 1973, Northwestern University
M.S. 1974, George Washington University
Struck, Kent D. N.D.
B.A. 1966, Harvard University
Sunderland, Pearson Md.
B.A. 1974, Harvard University
Tanzer, Peter P. Pa.
B.S. 1974, George Washington University
Tarassoff, Peter G. Va.
B.S. 1969, Ph.D. 1974, George Washington University
Taub, Steven L. N.Y.
B.A. 1974, City University of New York, Queens College
Taylor, George A. Mich.
B.S. 1974, George Washington University
Tinker, Alice Va.
B.S. 1972, University of Maryland
Tonnemacher, Kent D. Calif.
B.A. 1972, University of California, Berkeley
Tossell, Julia W. Md.
B.A. 1969, Radcliffe College
M.A. 1970, Columbia University
Trenbath, Richard S. D.C.
B.A. 1965, University of North Carolina at Chapel Hill

Wahl, Richard — N.Y.
B.A. 1973, University of Rochester
Waltos, David L. — Conn.
B.S. 1974, Trinity College
Weed, Thomas S. — Kans.
B.A. 1974, Williams College
Weilburg, Jeffrey B. — N.Y.
B.S. 1974, Union College
Wells, John J. — Ohio
B.S. 1974, Notre Dame University
Wemple, Donna W. — Md.
B.S. 1973, University of Maryland
Wilbur, Andrew C. — Ill.
B.A. 1974, Stanford University
Wilcox, Sandra L. — Va.
B.S. 1970, M.S. 1974, Massachusetts Institute of Technology
Winnick, Sheldon
B.A. 1965, University of California, Be
Wisoff, Jeffrey H.
B.S. 1974, Union College
Wong, Albert K.
B.A. 1974, St. John's University
Woolf, Murray A.
B.A. 1974, University of California, Be
Wurzell, William D.
B.S. 1970, Boston College
M.A. 1972, George Washington Universi
Wyse, Roberta L.
B.A. 1974, Wellesley College
Ziegler, Penelope P.
B.S. 1973, George Washington Univers

Third Year

Allen, Donald W. — Mont.
B.A. 1972, University of Utah
Alper, Michael J. — N.J.
B.A. 1973, University of Pennsylvania
Altieri, Michael F. — Conn.
B.A. 1973, Colgate University
Anderson, Robert E. — Wash.
B.S. 1971, University of Washington
Anixter, William L. — Calif.
B.A. 1972, University of California, Berkeley
Artiss, Frederick L. — Md.
B.A. 1973, Johns Hopkins University
Barone, Charles J. — Mich.
Attended Wayne State University
Baxley, Robert S. — Wash.
B.S. 1972, Gonzaga University
Beall, John A., Jr. — N.D.
B.A. 1972, St. Olaf College
Benner, Charles M. — Ind.
B.S. 1973, American University
Bennett, Howard J. — N.Y.
B.S. 1972, University of Maryland
Bernstein, Robert M. — N.Y.
B.S. 1973, State University of New York at Albany
Bertolli, Susan J. — Calif.
B.A. 1970, University of California, Berkeley
M.A. 1972, Stanford University
Birnbaum, Stuart E. — Ga.
B.S. 1972, Emory University
Blatt, David E. — Ind.
B.A. 1973, Harvard University
Bliss, Mark C. — R.I.
B.S. 1973, University of Rhode Island
Blumberg, Neil H. — N.J.
B.A. 1973, Emory University
Bober, Douglas — Conn.
Attended Massachusetts Institute of Technology
Boscia, John A. — Md.
B.A. 1973, Duke University
Brenner, Myron D. — Pa.
B.A. 1963, Columbia University
B.Arch. 1968, University of Pennsylvania
Brickhouse, William D. — Va.
B.S. 1973, Clark College
Brinton, Milton H. — Calif.
Attended Brigham Young University
Brown, David L.
B.S. 1970, U.S. Military Academy
Cantamout, Steven E.
B.S. 1973, University of Santa Clara
Casas, Luis A.
B.A. 1973, Johns Hopkins University
Chung, Kenton L.
B.A. 1973, University of California, Berk
Clark, Bernard A.
B.S. 1973, Dickinson College
Clark, Gordon H., Jr
B.A. 1970, Yale University
M.Div. 1973, Pacific School of Religion
Cohen, Marc D.
B.A. 1973, Dartmouth College
Cole, Martha T.
B.A. 1967, Vassar College
Cooper, William
B.S. 1966, American University
Crisp, Ronald J.
B.S. 1967, Wheeling College
M.S. 1972, Georgetown University
Daniels, Toni D.
B.S. 1973, Fairleigh Dickinson University
Davis, Kathleen K.
B.A. 1968, Wellesley College
DeOrio, James K.
B.S. 1970, U.S. Air Force Academy
Dodge, John H.
B.A. 1973, Harvard University
Dolgin, Frederick C.
B.A. 1973, Yale University
Domaleski, Robert P.
B.S. 1973, St. Peter's College
Dondero, Lynn R.
B.A. 1972, B.A. 1973, University of Califor
Berkeley
Dudley, Martha D.
B.A. 1973, Brown University
Dynof, Francis R.
B.A. 1973, Rutgers—The State University
Eisenfeld, Larry S.
B.S. 1972, Muhlenberg College
Emsellem, Helene A.
Attended University of Maryland
Fang, Peter J.
Attended University of Maryland

Parker, Harrison Va.
B.S. 1969, Duke University

Feingold, Gail J. N.J.
B.A. 1972, University of Pennsylvania

Feldman, Stuart N.Y.
B.S. 1973, State University of New York

FitzHarris, Joseph B. N.Y.
B.S. 1973, U.S. Military Academy

Frisby, Shayla A. Va.
B.A. 1966, Trinity College, D.C.

Fuchs, Daniel G. Md.
B.A. 1973, Dartmouth College

Gurfinkle, Terry J. N.Y.
B.A. 1973, University of Pennsylvania

Glaza, Eve E. Utah
B.F.A. 1970, University of Utah

Glikin, Sanford E. Va.
B.S. 1973, George Washington University

Gorham, Jay R. Wash.
B.S. 1973, Washington State University

Gorman, Joel R. D.C.
B.A. 1973, Wesleyan University

Gorovoy, Mark S. N.J.
B.A. 1973, Duke University

Gosom, John Md.
B.A. 1972, Occidental College

Greene, Robert D. N.Y.
B.A. 1972, George Washington University

Hales, Robert E. Ill.
B.S. 1970, U.S. Military Academy

Hanowell, Leland H. Calif.
B.S. 1973, University of California, Davis

Harhay, Joseph S. N.Y.
B.A. 1972, Syracuse University

Harrison, Johnny Ruth Calif.
B.S. 1973, George Washington University

Hawkins, Matthew T., Jr. Pa.
B.S. 1971, University of Pennsylvania

Heinecke, Susan Kern Ill.
Attended Northwestern University

Hillman, Regina O. N.Y.
B.A. 1972, Bryn Mawr College

Hochman, Bruce N. Calif.
B.A. 1972, University of California, Berkeley

Holl, Thomas M. Ohio
B.S. 1973, George Washington University

Horn, Kenrick E. N.Y.
B.S. 1973, Tufts University

Hopkins, William P. Wis.
B.S. 1973, University of Minnesota

Horn, Martin S. N.H.
B.A. 1973, University of New Hampshire

Hotez, Lawrence S. Conn.
B.S. 1973, Trinity College, Conn.

Isaacshein, Ruth E. N.Y.
B.A. 1972, Washington University

Isaacson, Dale H. Md.
Attended Washington University

Jacobson, Jeff N.J.
B.A. 1973, University of Rochester

Kampmeier, Patricia A. Ill.
B.A. 1973, Northwestern University

Kanter, Mitchel A. Md.
B.S. 1973, Duke University

Kehne, Susan M. Md.
B.S. 1973, Mount Holyoke College

Keller, Marc S. N.Y.
B.A. 1973, Hamilton College

Knutson, Anne N.J.
B.A. 1973, University of Vermont

Kolzak, Nancy E. Va.
B.S. 1973, Smith College

Krembs, Gerhard A. II N.Y.
B.A. 1972, Eisenhower College

Kubik, Carolyn J. Ill.
B.A. 1973, University of Kansas

Kung, George Y. Wash.
B.S. in E.E. 1973, University of Washington

Kushner, Mark J. Md.
B.A. 1973, Johns Hopkins University

Lagin, Sheri J. N.Y.
B.A. 1973, George Washington University

Lalgon, Eugene E., Jr. Pa.
B.S. 1973, Muhlenberg College

Lamensdorf, Michael D.C.
B.A. 1973, Oberlin College

Lederer, Helen A. N.Y.
B.S. 1972, George Washington University

Lewis, Norman N.Y.
B.A. 1973, Vassar College

Libby, Louis S. Conn.
B.S. 1972, Tufts University

Liebermann, Joan V. N.Y.
B.A. 1973, University of Wisconsin—Madison

Lustig, Ilana D. N.Y.
B.S. 1973, Fairleigh Dickinson University

Maunder, Richard J. Calif.
B.A. 1972, University of California, Berkeley

Metelits, Joel B. Conn.
Attended Pennsylvania State University

Model, Lawrence M. N.J.
B.A. 1973, Rutgers—The State University

Mosby, John A. N.Y.
B.A. 1973, City University of New York, Hunter College

Neill, Marguerite A. N.J.
B.A. 1973, Bryn Mawr College

Nenonen, Rita S. N.Y.
B.A. 1968, Vassar College
M.S.W. 1970, University of Pennsylvania

Nielsen, Peter C. Calif.
B.S. 1973, Brigham Young University

Orak, John K. N.J.
B.S. 1973, St. Peter's College

Orvin, Donna C. Md.
B.A. 1969, Ed.M. 1971, Duke University

Parker, Paul M. N.J.
B.S. 1973, Union College, N.Y.

Paul, Michael L. Pa.
B.A. 1973, Temple University

Pavluk, Charles H. Ohio
B.G.S. 1973, University of Kentucky

Peck, Dawn Pa.
Attended Bucknell University

Peck, Thomas S. Ill.
B.S. 1972, Indiana University at Bloomington

Puro, David M. N.Y.
B.A. 1973, New York University

Rabkin, Anne E. Md.
B.A. 1973, Smith College

Rallis, Michael G. Va.
Attended George Washington University

Rhymers, Kurt L. Minn.
B.S. 1966, U.S. Military Academy
M.S. 1971, Stanford University

Roat, James W. D.C.
B.S. 1973, Pennsylvania State University

Rollins, Charles J. Md.
B.S 1972, George Washington University

Rose, Howard A. Mass.
B.A. 1973, Harvard University

Rosenberg, Gary J. N.Y.
B.S. 1973, George Washington University

Rosenfield, Louis D. Conn.
Attended George Washington University
Rusin, Grant M. N.J.
B.S. 1973, Fordham University
Ruttenberg, Rhoda Md.
B.A. 1961, Syracuse University
Saslow, Eric D. N.Y.
B.A. 1973, Cornell University
Schiffner, Craig A. N.J.
B.A. 1973, Princeton University
Schliftman, Alan B. N.Y.
B.A. 1973, University of Rhode Island
Schneider, Marta A. D.C.
B.A. 1973, Trinity College, D.C.
Schulman, Jeffrey M. Va.
B.A. 1973, George Washington University
Seibert, Donald G. N.Y.
B.S. 1973, Bucknell University
Shirley, Eric A. Mass.
B.A. 1973, Cornell University
Shumaker, Douglas R. Pa.
B.S. 1973, Pennsylvania State University
Siegel, Robert S. Pa.
B.A. 1973, Stanford University
Skahen, Deborah S. Ind.
B.A. 1973, Indiana University at Bloomington
Smith, Arthur R. III N.J.
B.A. 1973, Dartmouth College
Smith, Laurence R. Utah
Attended Weber State College
Sokoloff, Daniel O. Fla.
B.A. 1972, Tulane University
Stansfield, Stephen J. Wash.
B.S. 1973, Washington State University
Stetz, Christian W. Mass.
B.S. 1971, Massachusetts Institute of Technology
Stine, Walter S. Ohio
B.S. 1973, U.S. Air Force Academy
Stoddard, Ronald A. Utah
B.S. 1973, Brigham Young University
Thompson, Joanne
B.S. 1973, University of California, Los Angeles
Trice, James
B.S. 1972, City University of New York, Richmond College
Tway, Kenneth P.
B.S. 1973, Stanford University
Uretsky, Stephen H.
B.S. 1973, University of Maryland
Van Nice, Robert B.
B.S. 1970, Montana State University
Vickers, Curtis W.
B.A. 1973, University of Bridgeport
Walker, Lillie
B.S. 1964, Howard University
M.A. 1971, Catholic University
M.S. 1974, George Washington University
Wedberg, Robin C.
B.A. 1972, Stanford University
Weesner, Kenneth M.
B.S. 1973, Northern Arizona University
Weitz, Susan R.
B.S. 1973, Cornell University
Wertheimer, Debra S.
B.A. 1973, Goucher College
Widlitz, Michael D.
B.G.S. 1973, University of Michigan
Willis, James A.
B.A. 1966, M.A. 1968, University of California, Berkeley
Winchenbach, Curtis L.
B.A. 1972, Northeastern University
Winston, Jonathan A.
B.S. 1973, Muhlenberg College
Wright, Curtis IV
B.S. 1971, Haverford College
Yago, Kate
B.S. 1972, George Washington University
Zielinski, Christopher J.
B.S. 1973, University of Notre Dame

Fourth Year

Balsley, James F. Va.
B.S. 1964, Pennsylvania State University
Ph.D. 1969, Indiana University at Bloomington
Barnett, Peter R. Conn.
B.A. 1972, Wesleyan University
Beabeau, Daryl P. Ariz.
B.S. 1969, George Washington University
Bos, Norman C. Kans.
B.A. 1972, University of Kansas
Brancaccio, William R. N.Y.
B.A. 1972, Villanova University
Brauner, Robert E. Pa.
B.S. 1971, Cornell University
Braverman, Joseph S. N.Y.
B.S. 1970, City University of New York, City College
Brenner, Alan S. Wash.
B.A. 1972, University of Washington
Briggs, Richard R. Utah
B.S. 1972, University of Wyoming
Brown, Richard D. Pa.
B.A. 1970, Lehigh University
Bruckner, Nancy V.
B.A. 1972, University of Pennsylvania
Burk, Robert D.
Attended McGill University
Burka, Steven A.
B.S. 1972, Bradley University
Calvert, James F., Jr.
B.A. 1967, Harvard University
Castle, Robert L.
B.A. 1969, College of Wooster
Chan, Clara S. P.
B.S. 1972, Mary Manse College
Chandeysson, Paul L.
B.S. in E.E., B.S. in M.E. 1958, Washington University
M.S. in M.E. 1962, Stanford University
Cooper, Bruce S.
B.S. 1972, Bucknell University
Crump, Carolyn F.
B.S. 1972, Bennett College, N.C.
Cunningham, Peter L.
B.S. 1972, Union College, N.Y.

Danziger Richard E. Md.
B.A. 1963, Dartmouth College
Ph.D. 1968, University of Alberta
Dedick, Paul E. N.J.
B.A. 1971, Catholic University of America
DePoix, Christopher Va.
B.A. 1972, Princeton University
Doner, Kathy S. Mich.
B.S. 1970, Stetson University
M.P.H. 1972, University of Michigan
Dorman, Sanford A. Conn.
B.A. 1972, Hobart and William Smith Colleges
Doyle, John R. Md.
B.S. 1972, U.S. Air Force Academy
Duras, Steven G. Wash.
B.S. 1972, University of Washington
Earle, Martin F. Ohio
B.S. 1972, Carnegie-Mellon University
Elliott, Susan T. Md.
B.S. 1970, Bucknell University
M.S. 1972, George Washington University
Emhoff, Timothy A. Conn.
B.S. 1972, U.S. Air Force Academy
Enos, William F. Va.
B.A. 1972, Dartmouth College
Fernandez-Miranda, John A. Va.
B.S. 1968, Memphis State University
B.M.S. 1974, Dartmouth College
Finkelstein, Jerome L. N.Y.
B.A. 1972, New York University
Fisher, Daniel B. D.C.
B.A. 1965, Princeton University
Ph.D. 1969, University of Wisconsin—Madison
Fochios, Steven E. N.Y.
B.A. 1972, City University of New York, City College
Francis, Thomas E. Ala.
Attended Emory University
Friefeld, Richard S. N.Y.
B.A. 1970, Hofstra University
Galbavy, Edward J. N.Y.
B.S. 1971, Georgetown University
Gandy, Charles L. III N.M.
B.S. 1970, U.S. Military Academy
Gannon, Carmen Md.
B.S. in Nursing 1957, Loyola College
M.S. 1959, University of Maryland
Gardner, Richard L. Calif.
B.S. 1970, University of San Diego
Gold, Marjorie B. D.C.
B.A. 1969, Cornell College
Goldstein, Gary E. N.Y.
B.S. 1972, George Washington University
Goldstein, Stafford S. N.Y.
B.A. 1972, University of Pennsylvania
Gooch, Brent R. Idaho
B.S. 1972, Utah State University
Green, Leon M. N.D.
B.A. 1971, University of Kansas
B.Med.Sci. 1974, University of South Dakota
Greenwood, Lee H. Utah
B.A. 1972, University of Utah
Gurian, Ellen L. N.Y.
B.A. 1972, New York University
Hall, Julianna D.C.
B.S. in Med.Tech. 1965, George Washington University
Hamilton, Kathleen M. Pa.
Attended George Washington University
Hartman, Albert R. Utah
Attended Utah State University

Healy, Michael J. Utah
B.S. 1972, Weber State College
Hermann, Christopher P. Conn.
B.S. 1972, Villanova University
Hidalgo, Hector J. Va.
Attended George Washington University
Hillmann, Scott N.J.
B.A. 1972, University of Delaware
Hirschberg, Joel M. N.J.
B.A. 1972, George Washington University
Holt, Rickie B. Utah
B.S. 1972, Utah State University
Horn, Babette J. N.Y.
B.A. 1972, Barnard College
Horwitz, Stephen J. Md.
B.A. 1972, George Washington University
Hubenette, Antoinette T. Calif.
B.A. 1968, University of California, Berkeley
B.S. 1970, George Washington University
Huey, Richard G. Calif.
B.S. 1971, University of California, Berkeley
Hyldahl, Douglas R. Idaho
B.S. 1972, University of Utah
Johnson, Margery R. Mass.
B.A. 1972, Smith College
Jones, Noble S. D.C.
B.A. 1970, Swarthmore College
Kabnick, Lowell S. N.Y.
B.A. 1972, George Washington University
Katske, Floyd A. N.Y.
B.A. 1972, Rutgers—The State University
Kay, Douglass A. Md.
B.S. in M.E. 1969, Purdue University
Keahey, Thomas M. Fla.
B.A. 1972, George Washington University
Keenan, Andrew M. Md.
B.S. 1972, Tulane University
Kendall, Martha R. Vt.
B.A. 1969, Wellesley College
Kinziger, Mark S. Mich.
B.A. 1972, Kalamazoo College
Kiviat, Jeffrey H. N.Y.
B.S. 1972, Cornell University
Klein, Michael I. Md.
B.A. 1972, Washington and Jefferson College
Knutson, Eric L. N.J.
Attended Bucknell University
Kohrn, Bruce Z. Md.
B.A. 1972, Western Maryland College
Kope, Walter R. Conn.
B.S. 1972, University of Hartford
Kornreich, Michael N.Y.
B.A. 1971, George Washington University
Koroma, Banio P. Sierra Leone
B.S. 1972, Mount Union College
Kovacs, Karen F. Conn.
B.S. 1972, Bucknell University
Kozar, Mark D. Calif.
B.S. 1971, M.S. 1972, University of California, Irvine
Leo, Philip A. N.Y.
B.S. 1972, Bucknell University
Leonard, Andrea Md.
B.S. 1970, University of Michigan
Levin, Wayne S. Conn.
Attended Clark University
Locko, Roberta C. N.Y.
B.A. 1972, Manhattanville College
Longmore, James L. Md.
B.S. 1972, University of Maryland
Madden, Michael R. N.Y.
B.A. 1971, College of the Holy Cross

Madsen, Bard R. Calif.
B.S. 1972, Brigham Young University
Maher, Stephen C. Wash.
B.S. 1970, University of Notre Dame
Mason, Randall P. Md.
B.A. 1972, Northwestern University
McCowin, Marcia J. Calif.
B.A. 1972, University of California, Berkeley
McLoone, James R. Ariz.
B.A. 1972, University of Arizona
Merliss, Andrew D. N.J.
B.A. 1972, Colgate University
Mets, Marilyn B. R.I.
B.A. 1969, Wheaton College, Mass.
M.S. 1972, Harvard University
Morris, Ray D. II Ohio
B.S. 1972, University of Akron
Murphy, James P., Jr. D.C.
B.A. 1972, Yale University
Nathanson, Barry R. N.Y.
B.S. 1972, State University of New York at Albany
Nemiro, Jay S. Pa.
B.A. 1972, Temple University
Nevius, Patricia D. D.C.
B.A. 1971, Hiram College
Niechniedowicz, Lynne M. N.Y.
B.S. 1972, St. John's University, N.Y.
Oliver, Gregory C. N.J.
B.A. 1972, Colgate University
Orme, Geoffrey A. Utah
B.A. 1972, University of Utah
Ostroff, Robert B. Va.
Attended George Washington University
Oyewole, Morakinyo A. Nigeria
B.S. 1971, Federal City College
Pagnanelli, David A. Pa.
B.A. 1972, Temple University
Parkinson, Dennis K. Md.
B.A. 1970, University of California, Berkeley
Paul, Ronald A. Md.
B.A. 1971, Temple University
Pearl, Russell K. Conn.
B.A. 1972, University of Connecticut
Perkins, Edward W. N.D.
B.A. 1968, University of Rochester
M.A. 1972, B.S. in Med. 1974, University of North Dakota
Perlman, Mark L. Md.
B.A. 1972, Duke University
Petrovitch, Charis R. Calif.
B.S. 1972, Stanford University
Pollack, Louis D. N.Y.
B.S. 1971, George Washington University
Quan, Marvin M. Calif.
B.S. 1972, University of California, Davis
Quigley, James M. Md.
B.A. 1971, Wesleyan University
Quinn, Michael J. N.Y.
B.A. 1972, Dartmouth College
Rabkin, Lawrence E. Md.
B.A. 1972, Yale University
Roberts, Jesse A., Jr. Mo.
B.A. 1972, Washington University
Romansky, Stephen H. Md.
B.A. 1966, Brown University
M.A. in Govt. 1972, George Washington University
Rosen, Leonard A.
B.A. 1971, George Washington Univers
Roth, Henry J.
B.A. 1972, Miami University
Roth, Paul B.
B.S. 1969, M.S. 1972, Fairleigh Dickins University
Sablove, Robert S.
B.S. 1971, University of New York at A
Salter, David M.
B.S. 1972, California Polytechnic State University
Schneider, Donald R.
B.S. 1972, State University of New York at Buffalo
Schulman, Martin F.
B.A. 1964, New York University
Ph.D. 1968, Rutgers—The State Univers
Schuman, Paula C.
B.A. 1972, New York University
Seal, Craig M.
B.S. 1972, University of Utah
Seligson, Gene R.
B.S. 1972, George Washington Univers
Shapiro, Steven L.
B.S. 1972, Yale University
Sher, Robert J.
B.A. 1972, Hiram College
Shupe, David D.
B.A. 1972, University of Utah
Simonsen, Steven A.
B.S. 1972, St. Lawrence University
Smalley, David E.
B.S. 1972, Brigham Young University
Smith, Richard G.
Attended Brigham Young University
Spiegel, Jane S.
B.A. 1971, Duke University
Spinella, Joseph A.
B.A. 1971, University of Pennsylvania
Strawberry, Carl W.
B.S. 1972, St. Vincent College
Talboys, Paul A.
B.A. 1972, University of Texas at Austin
Vangrov, Mark S.
B.A. 1970, Miami University
Vargyas, Joyce M.
B.A. 1970, George Washington University
Weaver, Albert J.
B.S. 1970, George Washington University
White, Gregory E.
B.A. 1972, St. Anselm's College
Willis, Dean N.
B.A. 1972, Assumption College
Wolfsheimer, Frank B., Jr.
B.S. 1971, Purdue University
Wong, Raymond P.
B.S. 1972, Fordham University
Woods, Anne M.
B.A. 1971, Catholic University of America
Yaffe, Bruce H.
B.A. 1972, George Washington University
Zolkind, Neil A.
B.S. 1972, George Washington University

Summaries of Registration, M.D. Program

Number of Registrants

Class entering 1975	152	Class entering 1973	152
Class entering 1974	152	Class entering 1972	147

Geographical Distribution of Medical Students

Alabama	2	Montana	1
Arizona	3	New Hampshire	2
Arkansas	1	New Jersey	52
California	61	New Mexico	1
Colorado	4	New York	117
Connecticut	27	North Carolina	5
District of Columbia	33	North Dakota	5
Florida	9	Ohio	11
Georgia	5	Pennsylvania	28
Hawaii	2	Rhode Island	2
Idaho	2	South Carolina	1
Illinois	9	Utah	20
Indiana	4	Vermont	5
Iowa	1	Virginia	36
Kansas	3	Washington	16
Louisiana	1	Wisconsin	5
Maine	3	Canada	1
Maryland	92	Hong Kong	1
Massachusetts	16	Nigeria	1
Michigan	7	Sierra Leone	2
Minnesota	2	Spain	1
Missouri	3		

Institutions in Which Medical Students Earned Degrees

Adelphi University	1	California Polytechnic State University	1
Akron, University of	1	California State University:	
Alberta, University of	1	San Francisco	1
Albright College	1	San Jose	1
American University	3	California, University of:	
Amherst College	2	Berkeley	23
Antioch College	11	Davis	2
Arizona, University of	1	Irvine	2
Arkansas, University of	1	Los Angeles	6
Assumption College	1	Santa Barbara	1
Bard College	1	Santa Cruz	1
Barnard College	2	Carnegie-Mellon University	1
Bennett College, N.C.	1	Catholic University of America	3
Boston University	3	Claremont Men's College	1
Bowdoin College	1	Clark College	1
Bradley University	1	Colgate University	7
Brandeis University	2	Colorado, University of	2
Bridgeport, University of	1	Columbia University	10
Brigham Young University	12	Connecticut College	1
Brown University	8	Connecticut, University of	2
Bryn Mawr College	2	Cornell College	1
Bucknell University	5		

Cornell University	14
Dartmouth College	8
Delaware, University of	2
Dickinson College	3
Dubuque, University of	1
Duke University	10
Earlham College	1
Eastern Washington State College	1
Eisenhower College	1
Emory University	4
Fairleigh Dickinson University, Rutherford	2
Fairleigh Dickinson University, Teaneck	1
Federal City College	1
Florida, University of	1
Fordham University	2
Franklin and Marshall College	1
George Washington University	72
Georgetown University	7
Georgia Institute of Technology	1
Gettysburg College	1
Gonzaga University	1
Goucher College	1
Hamilton College	3
Hartford, University of	1
Harvard University	9
Haverford College	2
Hawaii, University of	1
Hiram College	2
Hobart and William Smith Colleges	11
Hofstra University	1
Holy Cross, College of the	1
Howard University	8
Illinois, University of, at Urbana-Champaign	1
Indiana University at Bloomington	4
Ithaca College	1
Johns Hopkins University	9
Kalamazoo College	1
Kansas, University of	4
Kentucky, University of	1
Kenyon College	1
Lehigh University	1
Lake Forest College	1
Lewis and Clark College	1
London, University of	1
Louisiana State University	1
Loyola College	1
Macalester College	1
Maine, University of	2
Manhattanville College	1
Marquette University	1
Mary Manse College	1
Maryland, University of	9
Massachusetts Institute of Technology	
McGill University	
Memphis State University	
Miami University	
Miami, University of	
Michigan, University of	
Michigan State University	
Mills College	
Minnesota, University of	
Missouri, University of—Columbia	
Montana State University	
Mount Holyoke College	
Mount Union College	
Muhlenberg College	
New Hampshire, University of	
New York, City University of:	
Brooklyn College	
City College	
Hunter College	
Queens College	
Richmond College	
New York, State University of:	
at Albany	
at Buffalo	
at Stony Brook	
New York University	
North Carolina, University of, at Chapel Hill	
North Dakota, University of	
Northeastern University	
Northern Arizona University	
Northwestern University	
Notre Dame, University of	
Oberlin College	
Occidental College	
Ohio Wesleyan University	
Pacific School of Religion	
Pacific, University of the	
Pennsylvania State University	
Pennsylvania, University of	
Princeton University	
Purdue University	
Radcliffe College	
Rhode Island, University of	
Richmond, University of	
Rochester, University of	
Rutgers—The State University	
St. Anselm's College	
St. John's College	
St. Lawrence University	
St. Olaf College	
St. Peter's College	
St. Vincent College	
San Diego, University of	
Santa Clara, University of	

Seton Hall University	1	Vassar College	3
Smith College	4	Vanderbilt University	2
South Dakota, University of	1	Vermont, University of	5
Stanford University	17	Villanova University	2
Stetson University	1	Virginia, University of	1
Swarthmore College	4	Wake Forest University	1
Syracuse University	2	Washington and Jefferson College	1
Temple University	4	Washington and Lee University	1
Texas Graduate School of Biomedical Sciences	1	Washington State University	2
Texas, University of, at Austin	2	Washington University	9
Toronto, University of	1	Washington, University of	10
Trinity College, Calif.	1	Wayne State University	2
Trinity College, Conn.	4	Weber State College	2
Trinity College, D.C.	3	Wellesley College	3
Tufts University	10	Wesleyan University	7
Tulane University	2	Western Maryland College	1
Union College, N.Y.	5	Wheaton College, Mass.	3
U.S. Air Force Academy	5	Wheeling College	1
U.S. Military Academy	5	Williams College	2
U.S. Naval Academy	2	Wisconsin, University of—Madison	5
Utah State University	2	Wooster, College of	1
Utah, University of	10	Wyoming, University of	1
Sarah Lawrence College	1	Yale University	8
		Yeshiva University	1
Number of college graduates	582	Number of institutions represented	182

Recipients of the Degree of Doctor of Medicine, 1975

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Steven Amster, New Jersey B.A. 1968, Middlebury College	Brooke Army Medical Center, San Antonio, Tex.
Margaret Andrews, Maryland B.A. 1971, Mount Holyoke College	Children's Hospital, Washington, D.C.
George Besch, Connecticut B.S. 1971, Trinity College, Connecticut	George Washington University Hospital, Washington, D.C.
Keith Boman, Nevada B.A. 1971, University of California, Santa Barbara	Los Angeles County Harbor General Hospital, Torrance, Calif.
John Boslego, Pennsylvania B.S. 1970, U.S. Military Academy	Walter Reed Army Medical Center, Washington, D.C.
Charles Brenton, Jr., New Jersey B.S. 1971, University of Maryland	St. Joseph Hospital, Syracuse, N.Y.
Michael Cain, New Jersey B.A. 1971, Gettysburg College	Barnes Hospital Group, St. Louis, Mo.
John Caldwell, California B.S. in Engr.Sc. 1971, Northwestern University	Los Angeles County-University of Southern California Medical Center, Los Angeles, Calif.
Richard Call II, Utah B.A. 1971, Brigham Young University	Brooke Army Medical Center, San Antonio, Tex.

* Appointments listed here are internships, except those preceded by a dagger (†), which are residencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Stuart Caplin, New York B.S. 1971, University of Miami	Nassau County Medical Center, East Meadow, N.Y.
John Carmen, Wyoming B.S. 1970, University of Wyoming	St. Joseph's Hospital, Flint, Mich.
William Chin-Lee, District of Columbia B.S. 1971, George Washington University	Prince Georges County Hospital, Cheverly,
William Choisser, Maryland B.S. 1971, Pennsylvania State University	Naval Hospital, Charleston, S.C.
David Clark, New Jersey B.A. 1971, Dartmouth College	Dartmouth Affiliated Hospitals, Hanover, N
Leon Clarke, Liberia B.A. 1971, Washington and Jefferson College	Hospital of the University of Pennsylvania Philadelphia, Pa.
Alan Cohen, Maryland B.A. 1972, George Washington University	George Washington University Hospital, Washington, D.C.
Carl Cricco, New Jersey B.S. 1971, Fairfield University	Madigan Army Medical Center, Takoma, W
John Cumming, New Jersey B.A. 1971, Ohio Wesleyan University	Grady Memorial Hospital, Atlanta, Ga.
Edward Curry, District of Columbia B.S. 1963, Morehouse College	University of Illinois Affiliated Hospitals Chicago, Ill.
James Davis, New Jersey B.A. 1971, Lafayette College	University of Wisconsin Affiliated Hospitals Madison, Wis.
Randall Daynes, Utah B.A. 1971, University of Utah	Good Samaritan Hospital, Phoenix, Ariz.
Kent DiFiore, Nevada B.S. 1970, George Washington University	University of Utah Affiliated Hospitals, Salt Lake City, Utah
Marlin Dimond, Utah B.A. 1972, University of Utah	North Carolina Memorial Hospital, Chapel Hill, N.C.
Martha Donegan, North Carolina B.A. 1971, University of North Carolina at Chapel Hill	University of Virginia Hospital, Charlottesville, Va.
Robert Dorff, Ohio B.S. 1971, Georgetown University	Ohio State University Hospitals, Columbus, Ohio
Edward Doyle, Jr., Virginia B.S. in Engr. 1970, Duke University	Naval Hospital, Camp Pendleton, Calif.
Daniel Elliott, California B.A. 1971, Stanford University	University of Oregon Medical School Hospitals Portland, Ore.
Nicholas Ellyn, New Jersey B.S. 1971, University of Maryland	Washington Hospital Center, Washington, D.C.
Stuart Farber, New York B.A. 1971, George Washington University	Presbyterian Hospital, New York City, N.Y.
Nicolae Filipescu, Virginia Ph.D. 1957, University of Industrial Chemistry, Polytechnic Institute, Rumania Ph.D. 1964, George Washington University	George Washington University Hospital, Washington, D.C.
Arthur Fitzmaurice, Massachusetts B.A. 1971, Anselm's College	Bridgeport Hospital, Bridgeport, Conn.
Robert Footer, Maryland B.S. 1971, Ohio State University	Washington Hospital Center, Washington, D.C.
Lawrence Fortuna, South Dakota B.S. 1969, M.S. 1971, South Dakota State University B.S. in Med. 1973, University of South Dakota	Fort Gordon Army Medical Center, Fort Gordon, Ga.

* Appointments listed here are internships, except those preceded by a dagger (†), which are res
dencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Charles Frank, Maryland B.S. 1970, Washington and Lee University	Tripler Army Medical Center, Honolulu, Hawaii
Everett Freer, Jr., Nevada B.A. 1969, California Western University	San Diego County University Hospital, San Diego, Calif.
John Gale, District of Columbia B.A. 1970, Duke University	Franklin Square Hospital, Baltimore, Md.
Dorothy Gillespie, North Carolina B.S. 1971, North Carolina Agricultural and Technical State University	Misericordia Hospital, New York City, N.Y.
Michael Giuli, Virginia B.S. 1971, University of Alabama	U.S. Naval Reserve, Aerospace Medical Institute, Pensacola, Fla.
Robert Gladsden, District of Columbia B.A. 1971, Franklin and Marshall College	Mount Sinai Hospital, Cleveland, Ohio
Linn Goldberg, Oregon B.S. 1970, University of Oregon	University of California Hospital at Los Angeles, Los Angeles, Calif.
William Goldman, District of Columbia B.A. 1972, George Washington University	Los Angeles County-University of Southern California Medical Center, Los Angeles, Calif.
Jay Greenberg, New York B.A. 1971, George Washington University	Children's Hospital, Washington, D.C.
Robert Greenfield, Idaho B.A. 1968, George Washington University M.S. 1971, Georgetown University	University of Oregon Medical School Hospital, Portland Ore.
Courtland Hall, Missouri B.S. in Phar. 1966, University of Missouri—Kansas City	Northwestern University Medical Center, Evanston, Ill.
Ronald Hansing, Kansas B.S. 1967, Southern Illinois University	University of California Hospital at Los Angeles, Los Angeles, Calif.
James Hardy, Washington B.A. 1962, B.S. 1964, University of Washington	University of California Affiliated Hospitals at Irvine, Irvine, Calif.
Michael Hart, Maryland B.S. 1964, Ph.D. 1970, George Washington University M.S. 1966, University of Michigan	University of California Affiliated Hospitals at Irvine, Irvine, Calif.
Kenneth Hauck, New York B.S. 1968, U.S. Military Academy	Walter Reed Army Medical Center, Washington, D.C.
William Heron, District of Columbia B.A. 1971, Johns Hopkins University	George Washington University Hospital, Washington, D.C.
Michael Hieb, North Dakota Attended Creighton University	†Duluth Family Practice Residency, Duluth, Minn.
Smith Ho, Thailand B.A. 1966, Columbia Union College M.S. 1970, George Washington University	Georgetown University Hospital, Washington, D.C.
Frederick Hom, California B.A. 1971, University of California, Berkeley	Sepulveda Veterans Administration Hospital, Los Angeles, Calif.
Robert Howlsey, Washington B.S. 1971, University of Washington	University of Washington Affiliated Hospitals, Seattle, Wash.
Susan Hughes, New York B.A. 1971, Manhattanville College	University of California Affiliated Hospitals at Irvine, Irvine, Calif.
Marc Jacobs, Maryland B.A. 1971, Washington University	Mount Zion Hospital, San Francisco, Calif.

* Appointments listed here are internships, except those preceded by a dagger (†), which are residencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Glenn Johnson, Colorado B.A. 1970, Princeton University	Hershey Medical Center, Hershey, Pa.
Marlene Jorris, Maryland B.A. 1962, Adelphia University B.S. in Ch.E. 1964, M.S. in Ch.E. 1969, Massachusetts Institute of Technology	Montgomery Regional Medical Foundation, Montgomery, Ala.
Cathryn Kaiser, New Jersey B.A. 1970, Elmira College	University of Wisconsin Affiliated Hospitals, Madison, Wis.
Harvey Katzen, Maryland B.S. 1972, Georgetown University	George Washington University Hospital, Washington, D.C.
Mirle Kellett, Jr., Maine B.A. 1969, Dartmouth College	Boston City Hospital, Boston, Mass.
Fred Kessler, New York B.S. 1971, George Washington University	Indiana University Medical Center, Indianapolis, Ind.
Dennis Kimbleton, New Jersey B.A. 1971, Rutgers University, New Brunswick	Hershey Medical Center, Hershey, Pa.
Kenneth Kofoed, Utah B.S. 1971, University of Utah	University of Colorado Affiliated Hospital, Denver, Colo.
Vere Lancaster, Utah B.S. 1971, University of Utah	Latter Day Saints Hospital, Salt Lake City, Utah
Claude Lardinois, South Dakota B.A. 1971, B.S. in Med. 1973, University of South Dakota	David Grant U.S. Air Force Medical Center, Travis Air Force Base, Calif.
Andrew Lautin, New York B.A. 1970, Columbia University	Maimonides Medical Center, New York City, N.Y.
Martin Learn, District of Columbia B.A. 1971, University of Miami	†Los Angeles County-University of Southern California Medical Center, Los Angeles, Calif.
John Leichner, Maryland B.S. 1965, St. Joseph's College, Pa. M.S. 1967, Ph.D. 1970, Catholic University of America	Dartmouth Affiliated Hospitals, Hanover, N.H.
Jeffrey Lieberman, Ohio B.A. 1970, Miami University	St. Vincent's Hospital, New York City, N.Y.
Raymond London, Connecticut B.A. 1971, Clark University	Hartford Hospital, Hartford, Conn.
Frederick Lough, Jr., New York B.S. 1970, U.S. Military Academy	Walter Reed Army Medical Center, Washington, D.C.
Doris Lyonga, West Cameroun B.S. 1969, Barat College of the Sacred Heart	Los Angeles County-University of Southern California Medical Center, Los Angeles, Calif.
Monica MacDougall, Virginia B.A. 1970, Case Western Reserve University	Case Western Reserve University Affiliated Hospitals, Cleveland Ohio
Rosemarie Maddi, New York B.A. 1971, Mount Holyoke College	Cambridge Hospital, Cambridge, Mass.
Keith Maliniak, Pennsylvania B.A. 1971, Franklin and Marshall College	George Washington University Hospital, Washington, D.C.
Robert Mangasarian, Maryland B.A. 1971, Boston University	George Washington University Hospital, Washington, D.C.
Jason Mann, New York B.A. 1971, University of Pennsylvania	Beth Israel Hospital, Boston, Mass.
Richard Marble, Washington B.A. 1970, Claremont Men's College	Children's Hospital, Los Angeles, Calif.

* Appointments listed here are internships, except those preceded by a dagger (†), which are [illegible] dencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Steven Marcus, California B.A. 1970, University of Wisconsin—Madison	Los Angeles County-University of Southern California Medical Center, Los Angeles, Calif.
Lois Matsuoka, Hawaii B.A. 1971, Mills College	Cook County Hospital, Chicago, Ill.
George McCullars, Florida B.S. in Agri. 1968, University of Florida M.S. 1971, George Washington University	George Washington University Hospital, Washington, D.C.
Raymond Mehl, Kansas B.S. 1965, Ph.D. 1971, University of Kansas	National Naval Medical Center, Bethesda, Md.
Jeffry Metheny, Pennsylvania B.S. 1970, Geneva College	Dartmouth Affiliated Hospitals, Hanover, N.H.
John Miles, Jr., Ohio B.A. 1964, Brown University	University of Louisville Affiliated Hospitals, Louisville, Ky.
Carl Mills, New York B.A. 1971, Syracuse University	The New York Hospital, New York City, N.Y.
Edward Mohn, Jr., Texas B.A. 1968, George Washington University M.S. 1972, Georgetown University	Hospital of the University of Pennsylvania, Philadelphia, Pa.
Thomas Montgomery, Maryland B.S. 1971, Bucknell University	National Naval Medical Center, Bethesda, Md.
Clark Neuwelt, Indiana B.S. 1971, University of Wisconsin—Madison	George Washington University Hospital, Washington, D.C.
Alan Ney, District of Columbia B.S. 1971, St. Lawrence University	George Washington University Hospital, Washington, D.C.
Paul Ngumi, Kenya B.S. 1967, Central State University M.S. 1971, University of Dayton	Cook County Hospital, Chicago, Ill.
Frank Niechniedowicz, New York B.S. 1970, St. John's University, N.Y.	Syracuse Medical Center, Syracuse, N.Y.
Lucille Norstrand, New York B.A. 1971, Vassar College	The New York Hospital, New York City, N.Y.
Sharon O'Connor, New York B.A. 1971, Mount Holyoke College	University of Colorado Affiliated Hospitals, Denver, Colo.
Ruth O'Keefe, Wisconsin Attended Marquette University	Riverside Methodist Hospital, Columbus, Ohio
Chukuemeka Okehi, Nigeria B.A. 1971, University of Colorado	Cook County Hospital, Chicago, Ill.
Neil Okum, Michigan D.D.S. 1970, University of Detroit	University of Cincinnati Medical Center, Cincinnati, Ohio
Robert Osborne, Jr., Washington B.A. 1971, University of Washington	University of Colorado Affiliated Hospitals
Michael Page, Montana B.A. 1971, University of Colorado	Hershey Medical Center, Hershey, Pa.
Patrick Paglen, New York B.S. 1971, U.S. Air Force Academy	Wilford Hall U.S. Air Force Medical Center, Lackland Air Force Base, Tex.
Richard Palmer, New Mexico B.S. 1971, New Mexico State University	George Washington University Hospital, Washington, D.C.
Eugene Patterson, California B.A. 1969, Stanford University	Northwestern University Medical Center, Evanston, Ill.
Jacob Peters, California B.A. 1971, Pacific College	Valley Medical Center, Fresno, Calif.

* Appointments listed here are internships, except those preceded by a dagger (†), which are residencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Robert Phair, New Jersey B.S. 1967, Newark College of Engineering J.D. 1971, Georgetown University	Stanford University Hospital, Stanford, Ca
Sterling Piepgrass, Utah B.S. 1971, University of Utah	Michigan State University Affiliated Hospit East Lansing, Mich.
Allan Reed, New York B.A. 1972, George Washington University	George Washington University, Washington, D.C.
Deborah Rich, New York B.A. 1970, University of Pennsylvania	Miriam Hospital, Providence, R.I.
Peter Richards, California B.A. 1971, University of California, Los Angeles	University of Alabama Medical Center, Birmingham, Ala.
Arnold Rosenblatt, Maryland B.S. 1969, George Washington University	Miriam Hospital, Providence, R.I.
Michael Ross, New York B.S. 1971, Dickinson College	George Washington University Hospital, Washington, D.C.
Barry Rothman, Maryland B.A. 1971, George Washington University	George Washington University Hospital, Washington, D.C.
Richard Rucker, Arizona B.A. 1969, M.S. 1970, University of Arizona	University of Minnesota Hospitals, Minneapolis, Minn.
Julian Safran, Maryland B.A. 1972, George Washington University	George Washington University Hospital, Washington, D.C.
Gregory Schaefer, South Dakota B.A. 1971, University of South Dakota	Mayo Graduate School of Medicine, Rochester, Minn.
Peter Schauer, Connecticut B.S. 1971, University of Hartford	Hartford Hospital, Hartford, Conn.
Jeffrey Schlameus, Montana B.S. 1971, University of North Dakota	Doctors Hospital, Washington, D.C.
David Schutt, New York B.S. 1971, U.S. Air Force Academy	Malcolm Grow U.S. Air Force Medical Cent Andrews Air Force Base, Washington, D.C
Thomas Scott, Virginia B.S. 1969, George Washington University	George Washington University Hospital, Washington, D.C.
Henry Scovern, New Jersey B.A. 1971, University of Pennsylvania	Waterbury Hospital, Waterbury, Conn.
Leonard Seigel, New Jersey B.A. 1971, University of Rochester	Mount Sinai Hospital, New York City, N.Y.
Carl Shibata, California B.A. 1971, University of California, Los Angeles	Mercy Hospital, San Diego, Calif.
Dennis Shubert, Maine B.S. 1969, M.S. 1970, Tufts University	University of California Hospital at Los Ange Los Angeles, Calif.
Edward Sims, Illinois B.A. 1971, Northwestern University	Rush-Presbyterian-St. Luke's Hospital, Chicago, Ill.
Wallace Smith, Utah B.A. 1971, Weber State College	Fitzsimons Army Medical Center, Denver, Co
James Sorensen, California B.S. 1971, University of California, Berkeley	Valley Medical Center, Fresno, Calif.
Ronald Spier, New York B.A. 1970, New York University	University of Illinois Affiliated Hospitals, Chicago, Ill.
Sally Sveda, Connecticut B.A. 1965, Smith College M.S. 1968, Yale University	Boston City Hospital, Boston, Mass.

* Appointments listed here are internships, except those preceded by a dagger (†), which are re
dencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Joel Swartz, Ohio B.S. 1971, Ohio State University	Riverside Methodist Hospital, Columbus, Ohio
Nancy Sweet, New Jersey B.S. 1969, Chestnut Hill College	George Washington University Hospital, Washington, D.C.
Roger Tall, Idaho Attended Brigham Young University	Barnes Hospital Group, St. Louis, Mo.
Fitzroy Thompson, New York B.S. 1967, City University of New York, City College	New York Medical College-Metropolitan Hospital Center, New York City, N.Y.
John Tornow, South Dakota B.S. 1971, Creighton University B.S. in Med. 1973, University of South Dakota	Malcolm Grow U.S. Air Force Medical Center, Andrews Air Force Base, Washington, D.C.
Michael Trigg, Connecticut B.A. 1971, Trinity College, Conn.	Children's Memorial Hospital, Chicago, Ill.
Sally Trued, District of Columbia B.A. 1970, Northwestern University	George Washington University Hospital, Washington, D.C.
Donald Trumbull, New York B.S. 1971, McGill University	New Britain General Hospital, New Britain, Conn.
Glenn Van Atta, Ohio B.A. 1965, Ohio Northern University	University Hospital, Columbus, Ohio
Steven Warden, Maryland B.S. 1971, Muskingum College	Norfolk General Hospital, Norfolk, Va.
Jay Weiner, Maryland B.A. 1971, George Washington University	George Washington University Hospital, Washington, D.C.
Don Wiesner, Washington B.S. 1970, Oregon State University	University of Oregon Medical Center, Portland, Ore.
Charles Wile, New York B.A. 1971, Duke University	U.S. Air Force Medical Center Wright-Patterson, Wright-Patterson Air Force Base, Ohio
George Young, New York B.S. 1971, Columbia University	University of Minnesota Hospitals, Minneapolis, Minn.
Lawrence Zinar, Maryland B.E., B.S. 1968, State University of New York at Stony Brook	St. Elizabeths Hospital, Washington, D.C.

Recipients of Allied Health Degrees, 1975

Associate in Science

Kenneth St. Clair Allen, Maine
Nuclear Medicine Technology
Guzman Villanueva Alvarez, Jr., New Jersey
Medical Services Technology
Kevin Richard Amstutz, California
Medical Laboratory Technique
Ferdinand Monterey Balagtas, Maryland
Radiologic Technology
Ronald Michael Bashore, Pennsylvania
Medical Laboratory Technique
Jesse Martin Bogard, California
Medical Services Technology
William Herndon Brigge, Virginia
Medical Services Technology
James Emery Bruce, Illinois
Medical Services Technology
Elvis Bryant, Jr., Virginia
Medical Services Technology
Gary Paul Butts, Georgia
Medical Services Technology
Ronald Jay Carroll, California
Medical Services Technology
Mary Christine Chandler, California
Radiologic Technology
Harold Emile Chenevert, Jr., Hawaii
Medical Services Technology
Jimmie Carl Cobb, California
Medical Services Technology
Jack Mason Cranford, Texas
Medical Services Technology
Melvin Leroy Crest, Colorado
Nuclear Medicine Technology

* Appointments listed here are internships, except those preceded by a dagger (†), which are residencies.

William Frederick Day, Maryland
Medical Services Technology
Thomas Wilks Ellis III, North Carolina
Medical Services Technology
Paul David Falkenstein, Ohio
Medical Services Technology
Roger Wayne Farthing, Illinois
Medical Services Technology
Roger Harry Ferguson, Missouri
Medical Services Technology
Onnie William Ferris, Illinois
Medical Services Technology
Steve Michael Garman, Maryland
Medical Laboratory Technique
William Anthony Garvin, Virginia
Medical Services Technology
Robert Lee Grimm, Virginia
Medical Services Technology
Michael Houston Grizzle, Oklahoma
Medical Services Technology
Jesse Donald Harrahill, California
Medical Services Technology
William Wallace Harvey, Virginia
Medical Laboratory Technique
Allen Fillmore Heiner, California
Medical Services Technology
Gary Arlin Juhl, California
Radiologic Technology
William Joseph Klenke, Texas
Nuclear Medicine Technology
Richard Bernard LaCour, Jr., Louisiana
Medical Services Technology
Carol Douglas Lane, California
Medical Services Technology
Debra Carlton Largess, Oregon
Nuclear Medicine Technology
Joseph Bruce Laskowski, Virginia
Medical Services Technology
Gregory William Lazzaro, Pennsylvania
Medical Services Technology
Robert Joseph Majors, Maine
Medical Services Technology
Dennis Laverne Martin, Illinois
Medical Services Technology
Lawrence Edward McGuire, Virginia
Medical Services Technology
Walter Robert Michajlyszyn, North Carolina
Medical Laboratory Technique
Carl Michael Michaud, Florida
Radiologic Technology
Joseph Walter Mucha, California
Nuclear Medicine Technology
LeRoy Robert Oly, Maryland
Radiologic Technology
Eric James Paavola, California
Medical Laboratory Technique
Ralph Eldridge Patton, Arkansas
Medical Laboratory Technique
Joseph Wesley Pugh, Virginia
Medical Services Technology
Nicasio Rutor Rabino, Washington
Radiologic Technology
Arthur Ernest Randall, New York
Medical Services Technology
Gary Wayne Reash, Florida
Medical Services Technology
Charles David Renevier, California
Medical Services Technology
Ronald Scott Rhynard, Colorado
Medical Services Technology
Ron Henry Ripple, Florida
Radiologic Technology
Earnest Harry Robinson, Jr., Arizona
Medical Services Technology
Neil Loran Sanders, Wisconsin
Medical Services Technology
Charles Marion Savage, Alabama
Medical Services Technology
Hans Peter Schmidt, California
Medical Services Technology
Stephen Perry Shasteen, Tennessee
Medical Services Technology
Edward Rudolph Simmons, California
Nuclear Medicine Technology
Brian Dennis Sims, Georgia
Medical Services Technology
Donald Barrett Smith, Tennessee
Medical Services Technology
David Allen Sonsthagen, Florida
Medical Laboratory Technique
Clement John Stankiewicz, Texas
Nuclear Medicine Technology
Gregory Earl Supancheck, California
Medical Services Technology
Chris Larry Swan, California
Medical Services Technology
Robert Joseph Szabo, Maryland
Medical Laboratory Technique
Michael Everon Teague, North Carolina
Medical Services Technology
Robert John Thelen, Connecticut
Medical Services Technology
Michael James Thomas, Florida
Medical Services Technology
Louis William Valcourt, Rhode Island
Medical Services Technology
Michael Lee Warman, Maryland
Radiologic Technology
Donald Arthur Watkins, Jr., California
Medical Services Technology
Rickey Gene Weaver, Oregon
Medical Services Technology
Kenneth Norris Webb, North Carolina
Medical Services Technology
William Walter Webb, Virginia
Medical Services Technology
Russell Elenwood Webber, Jr., Virginia
Medical Services Technology
Ezell Westbrook, Maryland
Radiologic Technology
Fred Richard White, New York
Medical Services Technology

Bachelor of Science

Larry Richard Adam, Iowa
Medical Technology
Thomas Robert Adamski, West Virginia
Physician's Assistant
Bessie Lee Boyd, District of Columbia
Environmental Health
Cheryl Denise Brown, District of Columbia
Medical Technology

Thomas Howard Brown, Texas
Physician's Assistant
Clare Brittain Brumstetter, New York
Medical Technology
Joann Margaret Cocoros, District of Columbia
Medical Technology
Rafael Jacinto Convit, Venezuela
Environmental Health
Craig Alexander DeAtley, Virginia
Physician's Assistant
Lydia Ann Kowalewski, Maryland
Physician's Assistant
Diane Peggy Jauvtis, New York
Medical Technology
George Walter Jay, Utah
Environmental Health
B S in H.C.A. 1975, George Washington University
Frank John Kolosky, West Virginia
Physician's Assistant
Diane Legum, Virginia
Physician's Assistant
Craig William Mertz, Maryland
Physician's Assistant
Nancy Dee Miller, Pennsylvania
Medical Technology
Susan Phibbs Riley, District of Columbia
Physician's Assistant
B.A. 1965, University of Colorado
Margaret Myracle Schwarz, Maryland
Environmental Health
Sean Arlyn Scott, Maryland
Physician's Assistant
Marc Lee Siditsky, New York
Physician's Assistant
B.B.A. 1971, George Washington University
Dorothy Gaye Simons, Maryland
Medical Technology
John Joseph Walsh, Jr., District of Columbia
Physician's Assistant
Clifford Williams, District of Columbia
Physician's Assistant

Bachelor of Science in Environmental Health

David Dittman, California

Vendetta Sheridan Dozier, District of Columbia

APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be sub
to change in connection with the establishment of judicial processes. Bulle
and handbooks incorporating any changes will be issued as appropriate.

**The following resolution, submitted by the University Senate, was appro
by the University's Board of Trustees on October 19, 1968:**

Whereas, safety and order are essential preconditions of the learning proc
and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection
free speech and freedom of assembly, and to safeguarding the right of law
protest on campus; and is committed equally to maintaining the peace a
safety of the campus, in the knowledge that all rights are in jeopardy wh
violence and civil disorder prevail over law and reason:

*Now, therefore, be it resolved by the Senate of The George Washing
University:* that in the event a demonstration at this University exceeds t
bounds of free assembly and lawful advocacy, and demonstrators are engag
in unlawful acts which cause or imminently threaten injury to persons or pro
erty, or which obstruct or interfere with normal and necessary University act
ties, this body affirms the authority of the President, or other University offici
designated to act in his absence, to take such reasonable steps, if possible af
consultation with the Chairman of the Executive Committee of the Univers
Senate* and the President of the Student Body, as are required to restore or
preserve order; including, if deemed necessary and appropriate, suspension
students or faculty engaging in such acts, and use of such law enforcement p
sonnel as are needed to effect the removal, arrest, and prosecution of law vio
tors. Any such suspension shall be reviewed by an appropriate tribunal as soo
after order is restored as is practicably possible.

**The following was approved by the University's Board of Trustees on Octob
19, 1968:**

Any student suspended from The George Washington University on t
grounds of exceeding the bounds of free assembly and lawful advocacy sha

* The University Senate has been renamed the Faculty Senate.

have his suspension reviewed by the Hearing Committee on Student Affairs* of the George Washington University as soon after order is restored as is practicably possible.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968:†

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.
† Amended January 18, 1973.

(a) who engages in conduct that unreasonably obstructs teaching, rese
and learning, or

(b) who unreasonably obstructs free access to members or guests o
University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests o
University,

may be punished for his conduct by dismissal from the University, or by
lesser disciplinary action, through procedures established within the Unive
for the government of its members.

In order to insure due process, any student subject to dismissal or other
ciplinary action on the grounds of violating any of the premises of this re
tion shall have, at his discretion, the right of review of the action by the Un
sity Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by
Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

COLLEGE OF GENERAL STUDIES, Dean of the College

NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

UNDERGRADUATE AND GRADUATE CATALOGUE (Arts and Sciences, Education, Government and Business Administration, Public and International Affairs)

SCHOOL OF MEDICINE AND HEALTH SCIENCES, Admissions Office, School of Medicine and Health Sciences

SCHEDULE OF CLASSES: FALL (Preregistration Edition, Revised Edition) AND SPRING SEMESTERS, Registrar

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COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart. Sc.) and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.F.S.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S.F.S.), Master of Science in Special Studies (M.S. in Sp.Std.) and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.), Bachelor of Science (B.S.) and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L. (Am.Prac.)) and Doctor of Juridical Science (S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), Engineer (Engr.), Applied Scientist (App.Sc.) and Doctor of Science (D.Sc.).

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelor of Science in Human Kinetics and Leisure Studies (B.S. in H.K.L.S.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.) and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.) and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Master of Arts (M.A.) and Master of Science in International Affairs (M.S.I.A.)

THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

THE DIVISION OF EXPERIMENTAL PROGRAMS, 1973

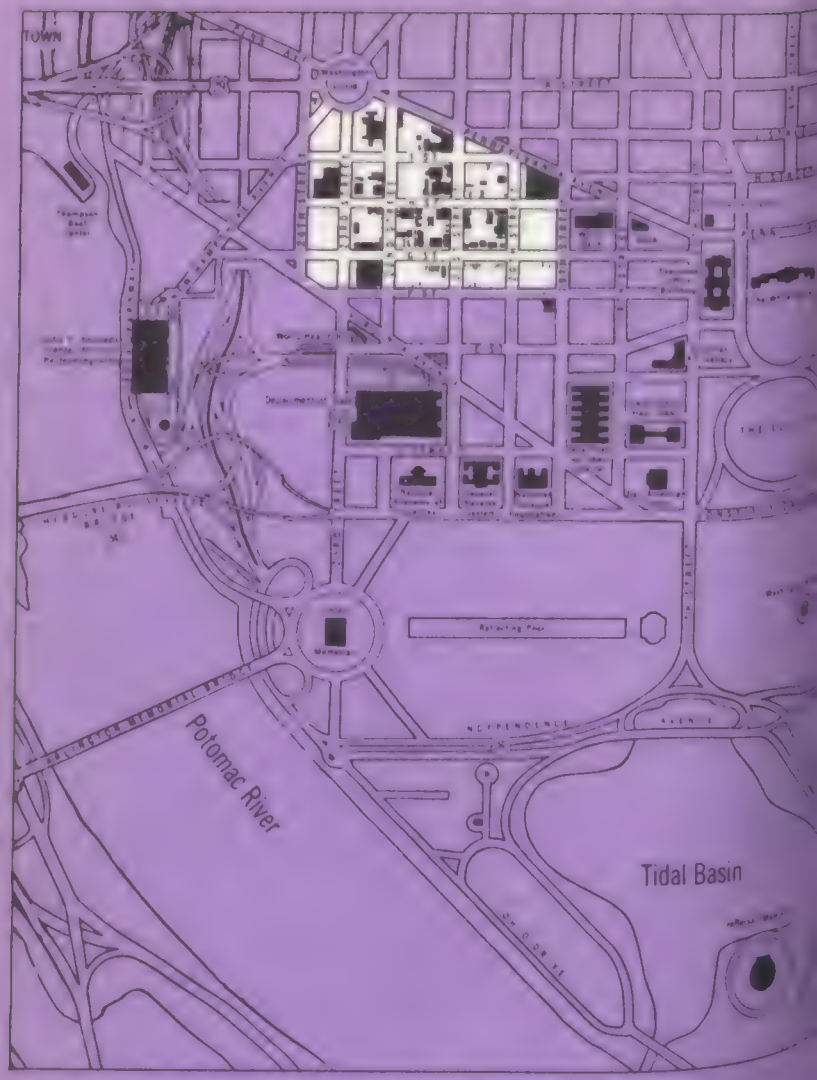
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Vol. LXXV, No. 8, July, 1976



NATIONAL
LAW
CENTER

1976-77



/ WASHINGTON, D.C.

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THE NATIONAL LAW CENTER

1976–1977

WASHINGTON, D.C. 20052



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THE CALENDAR 1976–77*

JUNE 1976

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1976 SUMMER TERM

May 24	Registration for all sessions (12 noon-7 p.m.) *Monday*
May 25	First-session and 13-week session classes begin *Tuesday*
May 31	Holiday *Monday*
July 2	First-session classes end *Friday*
July 5	Holiday *Monday*
†*July 6–8*	First-session examination period *Tuesday–Thursday*
July 9	Registration for students attending second-session only (2–6 p.m.) *Friday* Application for September 30 graduation due as part of registration
July 12	Second-session classes begin *Monday*
August 18	Last day of classes *Wednesday*
August 19–21	Second-session and 13-week session examination period *Thursday–Saturday*

* This calendar is subject to change.

† Courses in the 13-week session will meet on their regularly scheduled days during the week of July 5.

1976–77 FALL SEMESTER

August 19–20	Registration *Thursday* (12:30–7 p.m.) and *Friday* (3–7 p.m.) Application for February graduation due as part of registration
August 23	Classes begin *Monday*
September 6	Labor Day (holiday) *Monday*
October 8	S.J.D. dissertations of February candidates due *Friday*
November 24	Thanksgiving recess begins after last class *Wednesday*
November 29	Classes resume *Monday*
December 4	Last day of fall-semester classes *Saturday*
December 6–18	Reading and examination period *Monday–Saturday*
January 3	LL.M. theses of February candidates due *Monday*

1977 SPRING SEMESTER

**January 6–7*	Registration *Thursday–Friday* Application for May graduation due as part of registration
January 10	Classes begin *Monday*
January 20	Inauguration Day (holiday) *Thursday*
January 28	S.J.D. dissertations of May candidates due *Friday*
February 21	Winter Convocation (holiday) *Monday*
March 1	Application for 1977–78 teaching fellowships due *Tuesday*
March 26	Spring recess begins after last class *Saturday*
April 4	Classes resume *Monday*
April 28	Last day of spring-semester classes *Thursday*
May 2	LL.M. theses of May candidates due *Monday*
April 29–May 14	Reading and Examination period *Friday–Saturday*
May 22	Commencement *Sunday*

* Hours of registration to be announced.

THE NATIONAL LAW CENTE

HISTORY

THE LAW CENTER, the oldest law school in the District of Columbia, was es tablished in 1865 with a formal program of two years of study. This wa largely through the efforts of the Reverend George Whitefield Samson, Pres dent of Columbian College, whose action resulted in the purchase of a separa building for holding law classes. The building had belonged to Trinity Church of which Francis Scott Key had been Senior Warden. It was occupied by the Law Center until 1884.

Sixty graduates, from 22 of the then 37 states, received degrees in 186 The school continued to have a student body and a faculty which reflected the fact that it was at the seat of our nation's government. Associate Justices David J. Brewer and John Marshall Harlan of the Supreme Court of the United States were among the prominent members of the bench and bar who were on the faculty.

In 1877, one year after the first such program was adopted in the United States, the Law Center instituted a course leading to the degree of Master of Laws. In 1898, the course of instruction for the degree of Bachelor of Laws was extended to three years. The Law Center took part in 1900 in the organization of the Association of American Law Schools.

In the past quarter-century the Law Center expanded its course and seminar offerings with consideration of the needs of first-degree and graduate students. The degree of Doctor of Juridical Science was instituted in 1940. The need of foreign lawyers who came to this country and who required additional preparation for law work in the United States resulted in the creation of programs for the degrees of Master of Comparative Law in 1946 and Master of Comparative Law (American Practice) in 1951.

In 1954, National University School of Law, which had an important place in legal education in the District of Columbia since 1869, was absorbed by the George Washington University Law School.

Since 1954, programs of special research and study have enriched the basic curriculum. These include the Environmental Law Program; Patent Law Program; International Law Program; the Government Contracts Program; and the Law, Science, and Technology Program.

Additionally, the Law Center has been a leader in developing a curriculum to meet the legal needs of the poor and the disadvantaged. A clinical law

program has been developed which is the equal of that at any law school in the nation. Special projects include the Consumer Protection Center, the George Washington Legal Aid Bureau, and individual projects supervised by the Law Students Civil Rights Research Council.

Realizing the need for legal services for all members of society, the National Law Center, while maintaining its strong course offerings in patent law, administrative law, and corporate law, has developed a rich selection of courses in poverty law covering sales, civil rights, and welfare.

Alumni of the National Law Center have included United States Senators, Congressmen, Ambassadors, and Cabinet Members. Its graduates have gone on to become members of both the federal and state judiciaries as well as noted members of the bar of every state in the union.

UNIVERSITY POLICY ON EQUAL OPPORTUNITY

In accordance with the stated policy of its Board of Trustees and in conformity with federal laws and regulations, George Washington University does not discriminate against any person on the bases of sex, race, color, religion, or national origin in any of its education or employment programs or activities. Federal regulations implementing Title IX of the Education Amendments of 1972 call for an explicit statement that the requirement not to discriminate on the basis of sex extends to employment in and admission to such programs and activities.

Inquiries concerning the application of this policy and federal laws and regulations concerning discrimination in education or employment programs and activities may be addressed to the Office of the University's Coordinator of Equal Opportunity Programs or to the Director of the Office of Civil Rights of the Department of Health, Education, and Welfare.

LOCATION IN THE NATION'S CAPITAL

Of special significance is the location of the National Law Center in the nation's capital, the focal point of the law in action, both American and international. The work of the Center goes on in this environment, presenting a unique opportunity for observation and study of federal agencies—judicial, legislative, and administrative. Readily accessible are the Supreme Court of the United States, the federal trial and appellate courts of the District of Columbia, and, in addition, federal courts of special jurisdiction, such as the United States Court of Claims, the United States Court of Customs and Patent Appeals, the Tax Court of the United States, and the Court of Military Appeals. Current federal legislation can be studied as it is considered by Congressional committees and as it comes up for debate on the floors of the House of Representatives and the Senate. With respect to the federal administrative agencies, students here in Washington have matchless opportunities for study and observation. They can attend informal and formal hearings of these agencies and can obtain from the docket sections complete records of administrative adjudication in specific cases. Illustrative of such federal agencies are the Interstate Commerce Commission and the Civil Aeronautics Board in the field of transportation; the Federal Trade Commission in the field of trade regulation; the Securi-

ties and Exchange Commission in the field of security issues and corporate finance; the National Labor Relations Board in the field of labor-management relations; the United States Patent Office in the field of patent law; the Federal Power Commission in the field of water, natural gas, and electric power; and the Federal Communications Commission in the field of radio and television.

Supplementing these environmental advantages of law in action are the exceptional research library collections in the Library of Congress, in the various departments of the federal government, and in the libraries of the headquarters of national and international organizations. The notable library of the Carnegie Foundation for International Peace has been acquired by George Washington University for use of research students in international and comparative law, fields with respect to which Washington has come to be called "The Capital of the World."

The years of residence at law school are years of participation in the life of the community, which in the case of the George Washington University National Law Center is the government of the United States. As a consequence, the study of law takes on added meaning, whether the goal be government service or practice, general or specialized, and whatever the community in which the student plans to practice.

OBJECTIVES

The purpose of the National Law Center is to program men and women to meet the needs of society in many fields of law. As a national law school, the Center does not emphasize any particular geographic area in its instruction; therefore, it prepares students to practice law in any part of the country. The Center also offers a program of legal education for foreign students. The Law Center seeks to fulfill these objectives through (1) a rich and varied curriculum taught by eminent professors and highly qualified specialized instructors; (2) an extensive clinical law program where students learn legal skills by actual practice; (3) two law journals which specialize in public law and international law; (4) trial practice; (5) participation in the Van Vleck Appellate Case Club (a moot court competition); (6) a series of student professional co-curricular activities; (7) studies on an advanced level for foreign as well as for American students; and (8) a continuing legal education program for members of the bar.

The National Law Center Complex

The National Law Center Complex consists of three buildings: Stockton Hall, Bacon Hall, and the Jacob Burns Law Library.

STOCKTON HALL

Stockton Hall is the main classroom building. It also holds faculty offices and the offices of the Dean and the Associate Deans of the Law Center, as well as the Records Office and student lounges.

BACON HALL

Bacon Hall houses faculty offices; student lounges; the *George Washing* *Law Review* Office; the Government Contracts Program; the Admissions O fice; the Law Center Placement Office; the offices of the *Journal of Inte* *tional Law and Economics;* the Black America Law Student Association; t Law Students Civil Rights Research Council; the Van Vleck Appellate C Club; the *Advocate,* the law school newspaper; the Student Bar Association; th Consumer Protection Center; the Legal Aid Bureau; and Movimiento Le Latino, the national Latino law students association.

THE JACOB BURNS LAW LIBRARY

The Law Library of approximately 150,000 volumes is housed in the mod ern Jacob Burns Law Library Building, adjoining Stockton Hall on the south side. This facility, opened for use on October 1, 1967, comprises nine floor



and deck levels with about 49,000 square feet of floor space. Its shelf capacity now in place will accommodate over 175,000 volumes; with supplementary shelving in Stockton Hall and a small branch for the *Law Review* in Bacon Hall, the library provides space for almost 200,000 volumes. Seating for more than 500 readers is provided in four reading rooms, lounge and smoking areas, carrels, enclosed study cubicles, semi-private reading alcoves, and seminar rooms. Three photocopy machines are provided for reader use.

The collections comprise a comprehensive working library of Anglo-American law, with supplementary material in disciplines peripheral to law (such as business, finance, labor relations, sociology, criminology, political science, biography, foreign affairs, and others). Special areas are maintained for collections in tax law, labor law, patent-trademark-copyright law, international law, and foreign and comparative law. Included in the collections are the appellate decisions of all state courts and decisions of the federal courts, with comprehensive collections of English and Canadian court decisions; the currently annotated statutes of the 50 states; all federal statutes; English and Canadian statutes; selected statutes of other nations; and an extensive periodical collection, kept current by more than 950 subscriptions, covering virtually all American legal periodicals and most of those published in English throughout the world. The library is strong in its treatise holdings, administrative and regulatory materials, and Congressional coverage. The growing international law holdings include virtually complete collections of United Nations printed material and that of the European Economic Community, all recent material from the International Labor Organization, and current and retrospective collections of international treaties. A large portion of the holdings of the former library of the Carnegie Endowment for International Peace, acquired by the University in 1950, are in the Law Library.

The Juris Doctor Degree Program

ENTRANCE REQUIREMENTS

For information on "Application for Admission" to the Juris Doctor degree program, see page 28. Admission to candidacy for the degree of Juris Doctor requires a Bachelor of Arts or equivalent degree from an accredited college or university, a satisfactory quality of work, and an acceptable distribution of courses. Any substantial number of hours taken on a pass-fail or other ungraded basis may be seriously detrimental to an applicant's chances for admission. Eligibility is based on personal and scholastic records and on the result of the Law School Admission Test. No applicant will be acceptable in transfer who is ineligible to return in good standing to a previously attended law school. From the applicants, a selection is made by the Committee on Admissions.

Information concerning the Law School Admission Test may be obtained from the Dean of the National Law Center or from the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947 Center Street, Berkeley, Calif. 94704. The test is administered at various centers in the United States. It is anticipated that the testing dates for 1976–77 will be in October,

December, February, April, and July. Completed application blanks and [illegible] must be received by the Educational Testing Service at least two weeks be[illegible] the date of the test. It is not necessary that formal application for admiss[illegible] be made prior to taking the test.

ADVANCED STANDING

In unusual circumstances, advanced standing toward the degree of Juris Doct[illegible] may be granted for work of high quality successfully completed in other l[illegible] schools which are members of the Association of American Law Schools [illegible] are approved by the American Bar Association. Transferred credits will n[illegible] be recognized in excess of those which might be earned in a similar period [illegible] the National Law Center.

Advanced standing will not be granted for law work already counted towar[illegible] the Bachelor of Arts or other pre-legal degree.

TUITION DEPOSIT

Every student admitted to the National Law Center as a candidate for the d[illegible] gree of Juris Doctor must submit a tuition deposit ($100 initially plus $[illegible] later) after receipt of notification of acceptance. This deposit is credited towar[illegible] tuition.

PROFILE OF THE CLASS ENTERING IN THE FALL SEMESTER 1975–76

A first-year class of approximately 400 students was selected from more tha[illegible] 6,000 applicants from 700 colleges and universities. Applications were receive[illegible] from every state in the union. Thirty-seven per cent of the first-year class was [illegible] women.

The following colleges and universities are each represented by three or more members of the first-year class: American University, Boston University, Brig[illegible] ham Young University, Bucknell University, Cornell University, Dartmouth College, Dickinson College, Duke University, Emory University, Florida State University, Franklin and Marshall College, George Washington University, Georgetown University, Gettysburg College, Harvard University, Johns Hopkins University, Miami University, Northwestern University, Pennsylvania State University, Princeton University, City University of New York, Queens College, Rensselaer Polytechnic Institute, Smith College, State University of New York at Buffalo, State University of New York at Albany, State University of New York at Binghamton, State University of New York at Stony Brook, Syracuse University, Tulane University, University of Hawaii, University of Minnesota, University of Pittsburgh, University of California, Berkeley, University of Chicago, University of Illinois, University of Maryland, University of Michigan, University of Notre Dame, University of Pennsylvania, University of Rochester, University of Utah, U.S. Coast Guard Academy, U.S. Naval Academy, Washington University, Wellesley College, Wesleyan University, Williams College, Yale University.

THE CURRICULUM

The curriculum for the degree of Juris Doctor at the National Law Center offers the candidate one of the largest and most varied selections of courses in the country. First-year students are required to take courses entitled Civil Procedure; Constitutional Law; Contracts; Criminal Law and Procedure; Legal Research, Writing, and Professional Responsibility and Ethics; Property; and Torts. These courses give students the basis upon which all further legal study is built. In the second and third years of study, students must take Evidence and fulfill a two-credit legal writing requirement. Beyond these requirements the students are free to choose from the many course and project offerings. The Law Center prides itself on allowing students their freedom to design their own program of study.

The curriculum is organized so that students may begin the study of law for the Juris Doctor degree only at the start of the fall semester. Transfer students may enter at the start of the spring semester also.

Day Division

First Year

FALL SEMESTER		SPRING SEMESTER	
Contracts I	4	Contracts II	2
Torts	4	Property	4
Criminal Law and Procedure	4	Constitutional Law	4
Legal Research, Writing, and Professional Responsibility and Ethics	2	Civil Procedure	4
Total semester hours	14	Total semester hours	14

Second Year

FALL SEMESTER		SPRING SEMESTER	
Elective	14	Evidence	4
		Elective	10
Total semester hours	14	Total semester hours	14

Third Year

FALL SEMESTER		SPRING SEMESTER	
Elective	12	Elective	14
Legal writing requirement[1]	2		
Total semester hours	14	Total semester hours	14

[1] This requirement may be satisfied by service on the *Law Review*, by satisfactory completion of a seminar which requires a research paper, or by satisfactory completion of Law 344, *Legal Writing*.

Evening Division

First Year

FALL SEMESTER		SPRING SEMESTER	
Contracts I	4	Contracts II	
Torts	4	Criminal Law and Procedure	
Legal Research, Writing, and Professional Responsibility and Ethics	2	Civil Procedure	
Total semester hours	10	Total semester hours	

Second Year

FALL SEMESTER		SPRING SEMESTER	
Property	4	Constitutional Law	
Elective	6	Elective	
Total semester hours	10	Total semester hours	

Third Year

FALL SEMESTER		SPRING SEMESTER	
Elective	8	Evidence	
*Legal writing requirement	2	Elective	
Total semester hours	10	Total semester hours	

Fourth Year

FALL SEMESTER		SPRING SEMESTER	
Elective	10	Elective	
Total semester hours	10	Total semester hours	

Summer Term or Ninth Semester

Elective	4

REQUIREMENTS FOR THE DEGREE

The student must have completed a residence period of three academic years (four years for evening students) and 84 semester hours of required and elective courses, with a cumulative average of at least 65. At least one academic year of residence and 28 semester hours are required of students admitted with

* This requirement may be satisfied by service on the *Law Review*, by satisfactory completion of a seminar which requires a research paper, or by satisfactory completion of Law 344, *Legal Writing*

advanced standing. The work of the final semester or summer session must be completed while in residence at the National Law Center. Credits allowed by way of advanced standing are not included in computing the average required for graduation.

Graduation Requirements.—See pages 43–44 for a statement of the graduation requirements.

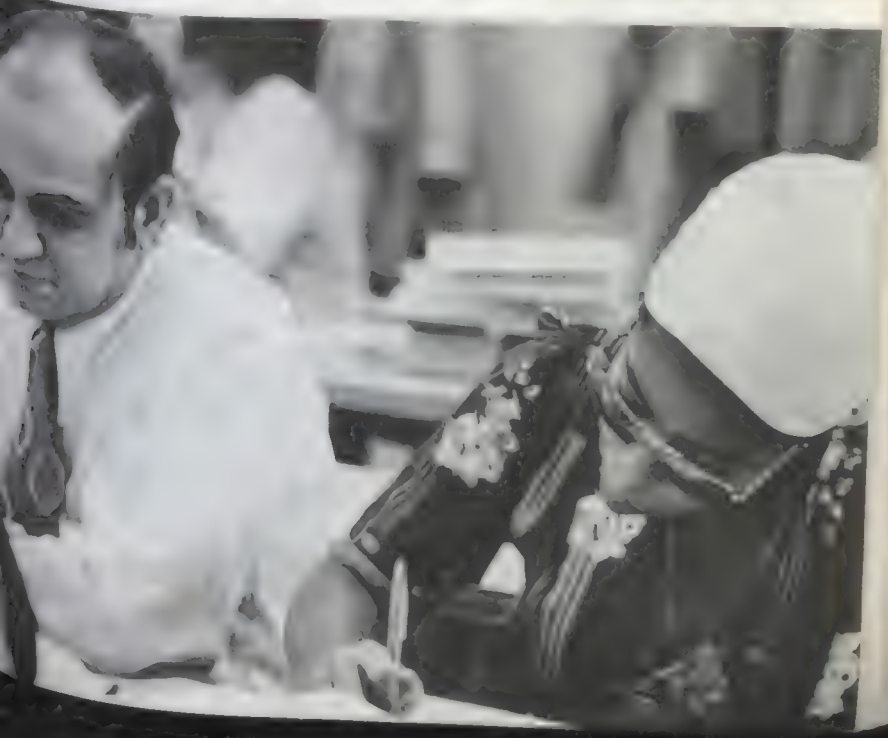
Residence

Candidates for the Juris Doctor degree must complete a residence period of three academic years. Attendance in the day division for the fall and spring semesters constitutes residence for an academic year; similar attendance in the evening division constitutes residence for three-fourths of an academic year. Consequently, a day student must attend 6 semesters to meet residence requirements; an evening student must attend 8. Students authorized to take schedules of less than 10 hours in the day division or less than 6 hours in the evening division receive residence credit on a proportional basis. Students who attend the summer sessions receive fractional residence credit.

HONORS

The following regulations apply to Juris Doctor candidates graduating in May, 1976, and after. For students graduating prior to May, 1976, the former regulations apply.

The degree of Juris Doctor "With Highest Honors" is awarded to those students, not exceeding 3 per cent of the graduating class, who have obtained the highest cumulative averages of at least 85 or better.



The degree of Juris Doctor "With High Honors" is awarded to those stude with the highest cumulative averages of 80 or better. The number of stude receiving degrees "With High Honors," when added to the total number students receiving degrees "With Highest Honors," may not exceed 10 per c of the graduating class.

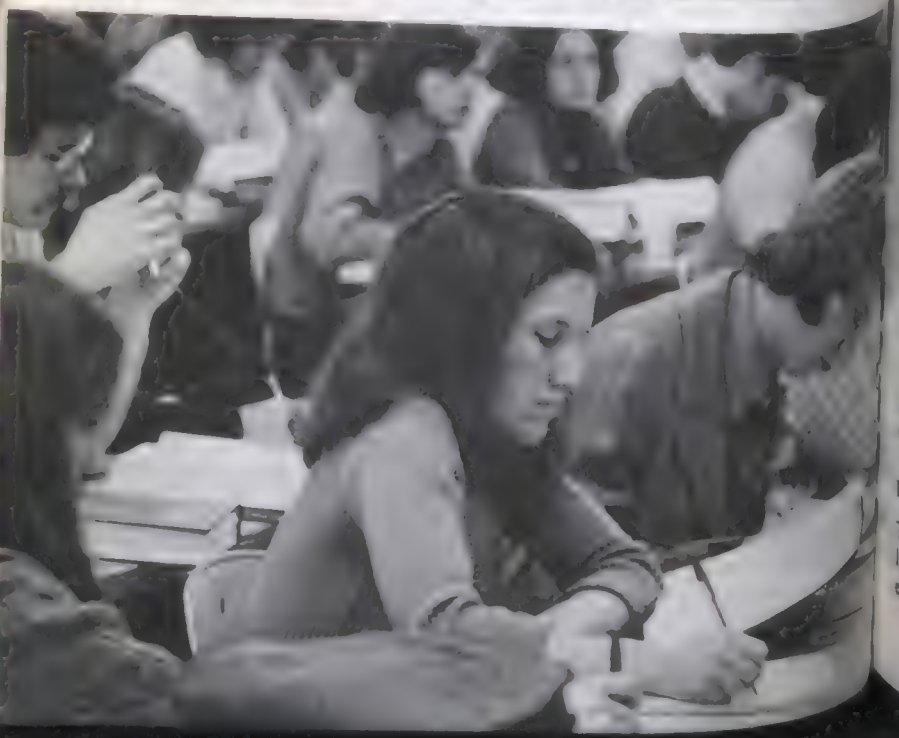
The degree of Juris Doctor "With Honors" is awarded to those students w the highest cumulative averages of 75 or better. The number of students re ceiving degrees "With Honors," when added to the total number of stude receiving degrees "With High Honors," and "With Highest Honors," may n exceed 40 per cent of the graduating class.

ORDER OF THE COIF

The Order of the Coif, a national legal honor society, aims "to foster a spir of careful study and to mark in a fitting manner those who have attained high grade of scholarship." The George Washington University Chapter wa established in 1926. Members are elected each year from the highest-ranking 10 per cent of the graduating Juris Doctor candidates.

PUBLICATIONS

The *George Washington Law Review*, published five times a year, is edited and managed by the students of the National Law Center. The *Law Review* is known for its emphasis on federal and public law; however, it is also de voted to research in other important legal areas. The staff of the *Law Review* is selected on the basis of a writing competition and on the basis of grades



The editorial board is selected from those students who have successfully completed the first year of *Review* work. Students receive 4 semester hours of academic credit for the two-year program.

The *Journal of International Law and Economics*, managed and edited by law students, is a biannual publication of the Law Center. It presents articles and commentaries on public and private international financial development, comparative law, and international law. The staff of the *Journal* is selected through a writing competition, and students earn academic credit for their work.

MOOT COURT

The Van Vleck Appellate Case Club provides realistic training in appellate oral advocacy for students in the National Law Center. Each year two competitions are held: the upperclass competition is held in the fall and the first-year competition is held in the spring.

LAW CENTER ORGANIZATIONS

Black America Law Student Association (BALSA)

The Black America Law Student Association is a national Black law students organization which has chapters at some 80 law schools. BALSA sponsors law speakers and various programs.

International Law Society

The International Law Society is an organization of students interested in the practice of international law. The Society sponsors speakers and various programs.

Movimiento Legal Latino

A national Latino law students organization which has chapters at various law schools, Movimiento Legal Latino sponsors law speakers and various programs.

Law Fraternities and Sororities

The chapters of Beta Kappa Pi, Delta Theta Phi, Phi Alpha Delta, and Phi Delta Phi at the National Law Center sponsor speakers and various social occasions.

Law Students Civil Rights Research Council (LSCRRC)

The Law Students Civil Rights Research Council is a national organization of law students concerned with the legal problems of civil rights. LSCRRC offers practical law projects for which students may receive academic credit.

Patent Law Club

The Patent Law Club, an organization of students interested in patent and related law, conducts an extensive speakers program as well as various social events.



Student Bar Association

The Student Bar Association is the law student governing body, responsible for allocating funds among the various student organizations. It also conducts a speaker program for the law school. All members of the student body are members of the Student Bar Association.

Tax Law Association

As an organization of students interested in careers in tax law, the Tax Law Association conducts various programs of interest to tax law specialists.

Women's Rights Committee (WRC)

The Women's Rights Committee is an organization of all the women in the law school. It is primarily interested in the place of women in law schools and in the legal profession. WRC conducts seminars and sponsors speakers.

Joint Juris Doctor—Master's Degree Program

In certain instances, arrangements may be made for students to work concurrently toward both the Juris Doctor degree in the National Law Center and a Master's degree in some fields in the University's Graduate School of Arts and Sciences, School of Government and Business Administration, or School of

Public and International Affairs. Fields in which this program is available include Business Administration, Economics, International Affairs, Political Science, Public Administration, and Public Affairs. Students must be admitted both to the National Law Center and, separately, to the School which will confer the Master's degree, and must meet all requirements in each degree program. It is possible for a student to complete work for both degree programs within four years.

Master's and Doctoral Programs

THE ADMINISTRATION OF JUSTICE under law is a matter so vast and complex that some who hold the Bachelor of Laws or Juris Doctor degree feel the need for further study. The Master's and doctoral programs give students the opportunity to broaden and deepen their understanding of the law.

The Master of Laws candidate may follow a program of general study or concentrate in one of the specialized areas listed below. Courses in each of these areas are included in the 401–600 series. Graduates who complete their work in one of these areas may have the field of specialization noted on their diplomas.

Administrative Law: Economic Regulation
Corporation Law
Environmental Law
Government Procurement Law
International and Comparative Law
Labor Law
Land Use Management and Control
Law and Poverty
Law, Psychiatry, and Criminology
Law, Science, and Technology
Patent and Trade Regulation Law
Taxation
Urban Legal Studies

Programs leading to the degree of Doctor of Juridical Science offer unusually talented advanced students, who have already earned the Master of Laws degree, the opportunity to concentrate on research and writing in a specific area of interest to the legal profession.

MASTER OF LAWS

Entrance Requirements

A Bachelor of Laws, Juris Doctor, or equivalent degree from a law school which is a member of the Association of American Law Schools or is approved by the American Bar Association is required. The applicant must have demonstrated a high degree of academic excellence. Advanced standing is not granted for credits earned while a candidate for the first degree in law or for credits earned at other law schools.

Degree Requirements

The student must complete a residence period of not less than two semesters which should be continuous. All requirements for the degree must be completed in this Law Center and in a period not exceeding three years from the time of initial graduate registration, unless an extension is granted in writing by the Dean. The student must complete 24 semester hours of courses and writing projects with acceptable grades. For all courses taken within the Law Center a student must attain the grade of 65 or above. For approved courses taken outside the Law Center, the grade of either *CR* (Credit) or *NC* (No Credit) is assigned. To receive the grade of *CR* (Credit) in a course taken in other graduate divisions of this University, a student is required to attain the grade of *B* or better. To receive the grade of *CR* (Credit) in a course taken at Georgetown University through the Consortium of Universities of the Washington Metropolitan Area, Inc., a student is required to attain the grade of B or better. A minimum cumulative average of 78 is required at all times for all LL.M. candidates admitted or readmitted after February 1976, or completing their degree requirements after February 1979. For candidates presently registered and continuously registered who receive their degree on or before February 1979, the minimum cumulative average required is 75. The student is expected to include Law 599–600 ***Thesis*** in the 24-semester-hour requirement for the degree (for exception, see "Master's Thesis," below).

Candidates for the degree in a selected field of specialization must complete a minimum of 12 of the required 24 semester hours in courses and writing projects related to the selected field. Each Master of Laws program of study may include a limited number of courses numbered in the 300 series, with the approval of the Dean.

The only credit hours that may be applied to any Post-J.D. degree are those completed while a duly enrolled candidate for that specific degree, with the following exceptions: (1) An unclassified student who has been admitted with the specific right to convert to degree status at the end of a specified number of hours, (2) An M.Comp.L. (Am.Prac.) candidate who does not maintain the average for that degree but would be in good standing for M.Comp.L. candidacy, and (3) the 8-hour course requirement for S.J.D. candidacy.

MASTER'S THESIS

Each candidate for the degree of Master of Laws is expected to write a Master's thesis (Law 599–600) under the supervision of a full-time member of the faculty of the National Law Center. Four hours of credit will be granted for successful completion of the thesis. The purpose of this requirement is to demonstrate the ability of the student to perform research in a special area of the law and to produce a scholarly paper containing the results of this research. The thesis is expected to be of substantially the same quality as a Law Review article. The Dean may waive the thesis requirement upon written request of the student, submitted no later than the beginning of the *final semester or summer session* before the student's graduation, provided the student has demonstrated research and writing ability by taking a minimum of 6 semester hours of course work at the National Law Center designated "Research Paper." No thesis waiver is granted for candidates for the degree of Master of Laws with specializations in international law or government procurement law.

The thesis in its final form must be presented to the adviser no later than the date specified in the Calendar. Two complete copies are required. It is the responsibility of the candidate to obtain from the Post-J.D. Programs Office a printed copy of the regulations governing the styling and reproduction of theses. The mandatory thesis binding fee of $10 must be paid at the time of registration for the last semester's work.

Accepted theses become the property of the University and are placed in the University Library and the Law Library, where the duplicate copies are bound and made available for circulation.

Honors

The degree of Master of Laws "With Highest Honors" is awarded students who obtain a minimum cumulative average of 85.

Graduate Courses in Other Departments

Master of Laws candidates may be permitted to take graduate courses related to their fields of interest in other departments of this University. A maximum of 6 semester hours will be credited toward the degree for such courses; however, credit will be granted only if the courses are given on campus. The grade of *CR* (Credit) or *NC* (No Credit) will be recorded for such courses. Courses numbered 101–200 may be taken for graduate credit only if the student receives the approval of the instructor at the time of registration and does additional work, as prescribed by the department offering the course.

Consortium of Universities of the Washington Metropolitan Area, Inc.

A candidate for the Master of Laws degree may take graduate courses at Georgetown University Law Center through the Consortium of Universities of the Washington Metropolitan Area, Inc. A maximum of 6 semester hours of such courses may be credited toward the degree. Permission to take Consortium courses must be granted by the Dean, the Registrar, and the instructor offering the course. The grade of *CR* (Credit) or *NC* (No Credit) will be recorded for such courses. To receive the grade of *CR* a student must attain a numerical grade of 80 or higher.

DOCTOR OF JURIDICAL SCIENCE

Entrance Requirements

Admission to candidacy for the degree of Doctor of Juridical Science requires a Bachelor of Arts or equivalent degree from an approved college or university; a Bachelor of Laws, Juris Doctor, or equivalent degree, earned with high rank, from a law school which is a member of the Association of American Law Schools or is approved by the American Bar Association; a Master of Laws degree with high academic standing; outstanding capacity for scholarly work in the field of law; and faculty approval of the applicant's dissertation topic. Applicants must also demonstrate their writing ability by submitting the Master's thesis or a copy of one or more papers or articles which the applicant has written. Following consultation with the Dean, the applicant must obtain a faculty adviser, to be designated "committee chairman," from the regular,

full-time faculty; reach agreement on the acceptability of the proposed to for the dissertation; and submit a detailed outline for the adviser's appro indicating by chapter and division within chapter the exact scope of project. There should be a bibliography for each chapter, listing books, ports, cases, and law review articles to be considered. Although the out cannot predict every detail of the subsequent research, it must be sufficient definite to afford the Graduate Board a basis for evaluation.

Once the outline is approved, the applicant's "committee" is expanded three members; this consultative committee must recommend the acceptan of the applicant to the full Graduate Board. The Board then acts upon recommendation and may either accept or reject the applicant as an S.J.D candidate. In no instance will any applicant be admitted to degree candi dacy prior to the above procedures; however, the applicant may be registered as an Unclassified Student for purposes of course work requirements (see below). Approval for degree candidacy must be received within one year of the ap pointment of an adviser unless a written extension is granted by the Dean.

Degree Requirements

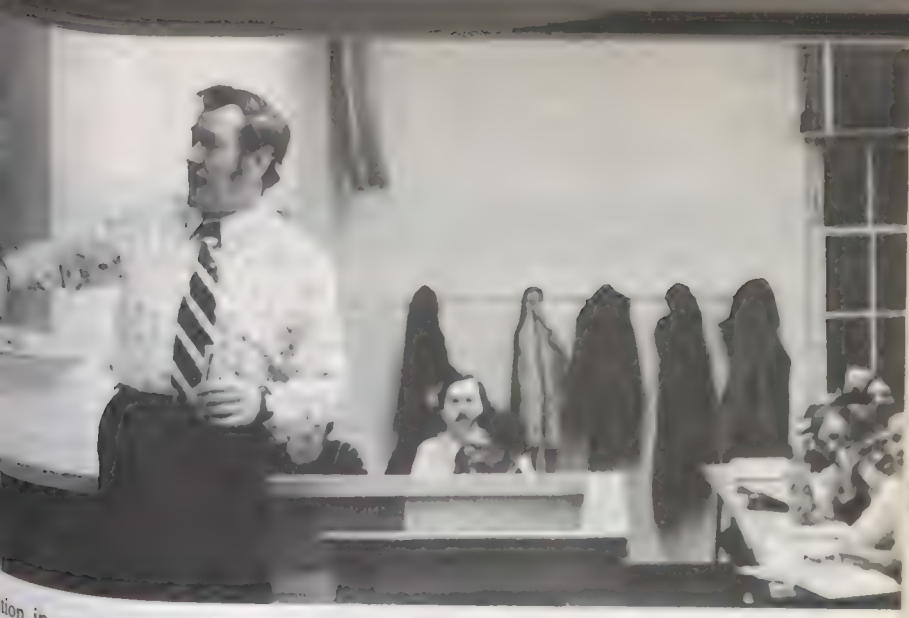
The candidate must complete (1) a residence period of not less than one aca demic year; (2) a course of study and research—designated by the consulta tive committee and approved by the Graduate Board—of no less than 8 se mester hours including *Jurisprudence*, unless previously taken; and (3) an ac ceptable dissertation. The dissertation must be submitted no later than three years from the date of admission to candidacy for the S.J.D. degree. The applicant who proposes to write on a comparative law topic must have a reading knowledge of the language in which the relevant materials are to be found. When the dissertation is submitted, the consultative committee will set the date for an oral examination. This examination is conducted by the con sultative committee and such other members of the faculty and qualified ex perts as are selected by the Graduate Board.

No later than the date specified in the Calendar (see page 5), the candidate must submit to the Dean two complete copies of the dissertation and two copies of an abstract (not to exceed 600 words) of his dissertation.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation and preparation of the abstract are available in the Office of the Dean. To be acceptable the dissertation must, in the opinion of the examining committee, constitute a substantial contribution to the field of law con cerned and be suitable for publication. Additional information will be supplied by the Dean. Accepted dissertations become the property of the University and are placed in the University Library and the Law Library, where the duplicate copies are bound and made available for circulation.

Degree Programs for Foreign Students

THE NATIONAL LAW CENTER has several programs of study available to students trained in law outside the United States. These programs fall into two general categories: (1) those directed toward preparing students for a bar examina-



tion in an American jurisdiction and (2) those that enable students to return to their countries with a more thorough understanding of some aspects of American law.

A student with a degree from a foreign law school who has met the extremely competitive admissions criteria will be admitted to the Center as a candidate for the Master of Comparative Law (M.Comp.L.) or Master of Comparative Law (American Practice) (M.Comp.L. [Am. Prac.]) degree.

To prepare for admission to the bar of an American jurisdiction, the student may apply for either the Juris Doctor or the Master of Comparative Law (American Practice) degrees. The J.D. degree requires 84 semester hours of work in law school (credit is given for work in a foreign law school only in exceptional circumstances) and will qualify the student to take most U.S. bar examinations. The M.Comp.L. (Am.Prac.) degree requires 28 semester hours of work and satisfies the requirements of the District of Columbia Bar. *Students are cautioned to ascertain the requirements of the bar for which they intend to qualify prior to selection of their law school programs.*

Foreign students planning to return to their home countries may undertake a program leading to the degree of Master of Comparative Law. This degree program enables the student to gain a broader comprehension of the American legal system by taking basic courses in the Law Center. However, it is not intended to qualify a student to take a U.S. bar examination.

ADMISSION PROCEDURE

pplication must be received from *foreign applicants* no later than June 1 or the fall semester (March 1 for candidates for the Juris Doctor degree), November 1 for the spring semester, and March 1 for the summer sessions.

equired Records

pplicants must request all educational institutions attended to send directly the Dean official credentials listing subjects studied, grades received, examations taken, and degrees received. Original diplomas, certificates, and anscripts from secondary schools and all colleges and universities attended

are required, but in exceptional cases certified copies will be accepted. Record of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

Language Test

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language* and attain as an absolute minimum the score of 550 to be admitted to the National Law Center. This is a mandatory requirement. Students are responsible for making arrangements for taking the test and should address inquiries to TOEFL, Educational Testing Service, Princeton, New Jersey 08540, U.S.A. The completed application form should be returned to the Testing Service at Princeton well in advance of the beginning of the semester for which the applicant seeks admission. The test fee, which should be remitted with the application, entitles the student to have the test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does *not* constitute application for admission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and an application blank. On the application for the test, the student should specify that the scores be sent to the Dean's Office.

ENTRANCE REQUIREMENTS

For the Degree of Juris Doctor.—Entrance requirements for foreign students are the same as those stated on page 11, except that advanced standing is rarely granted for study in foreign law schools.

For the Degrees of Master of Comparative Law and *Master of Comparative Law (American Practice).*—The entrance requirements are the successful completion of and graduation from a course in arts, philosophy, letters, or sciences, equivalent to graduation from a gymnasium, lycee, or liceo; and graduation in law with high academic standing from a recognized foreign university.

For the Degree of Master of Laws.—A foreign student will only be considered for admission to the Master of Laws program if he or she has a juris doctor or post-juris doctor degree in law with high academic standing from an American university.

For the Degree of Doctor of Juridical Science.—The usual entrance requirements are the successful completion of and graduation from a course in arts, philosophy, letters, or sciences, equivalent to graduation from a gymnasium, lycee, or liceo; graduation in law from a recognized foreign university; outstanding capacity for scholarly work in the field of law; and a Master of Laws degree with high academic standing from an American university.

DEGREE REQUIREMENTS

Juris Doctor, Master of Laws, Masters of Comparative Law, and *Doctor of Juridical Science.*—Degree requirements for foreign students are the same as those stated on pages 14–15, 20, and 22.

Master of Comparative Law.—The student must complete a residence period of not less than two semesters, which should be continuous. All requirements for the degree must be completed in a period not exceeding three years from the time of registration for the degree. The student must complete satisfactorily 24 semester hours of approved courses of the Center, or of such other departments of the University as the faculty of the Center shall approve, and must maintain a cumulative average of at least 55.

Master of Comparative Law (American Practice).—The requirements for this degree are the same as those for the degree of Master of Comparative Law except that this degree requires 28 semester hours of course work with a cumulative average of at least 65.

Unclassified Students

TWO TYPES OF STUDENTS may be admitted to the National Law Center as Unclassified Students, in accordance with the following regulations:

1. A candidate for a Bachelor of Laws or Juris Doctor degree with an above-average record at another law school which is a member of the Association of American Law Schools or is approved by the American Bar Association, may at the discretion of the Dean, be admitted as an Unclassified Student to earn credits for transfer to the other law schools. Such students are normally admitted only to the summer sessions. They are admitted to the fall or spring semester only in unusual circumstances.

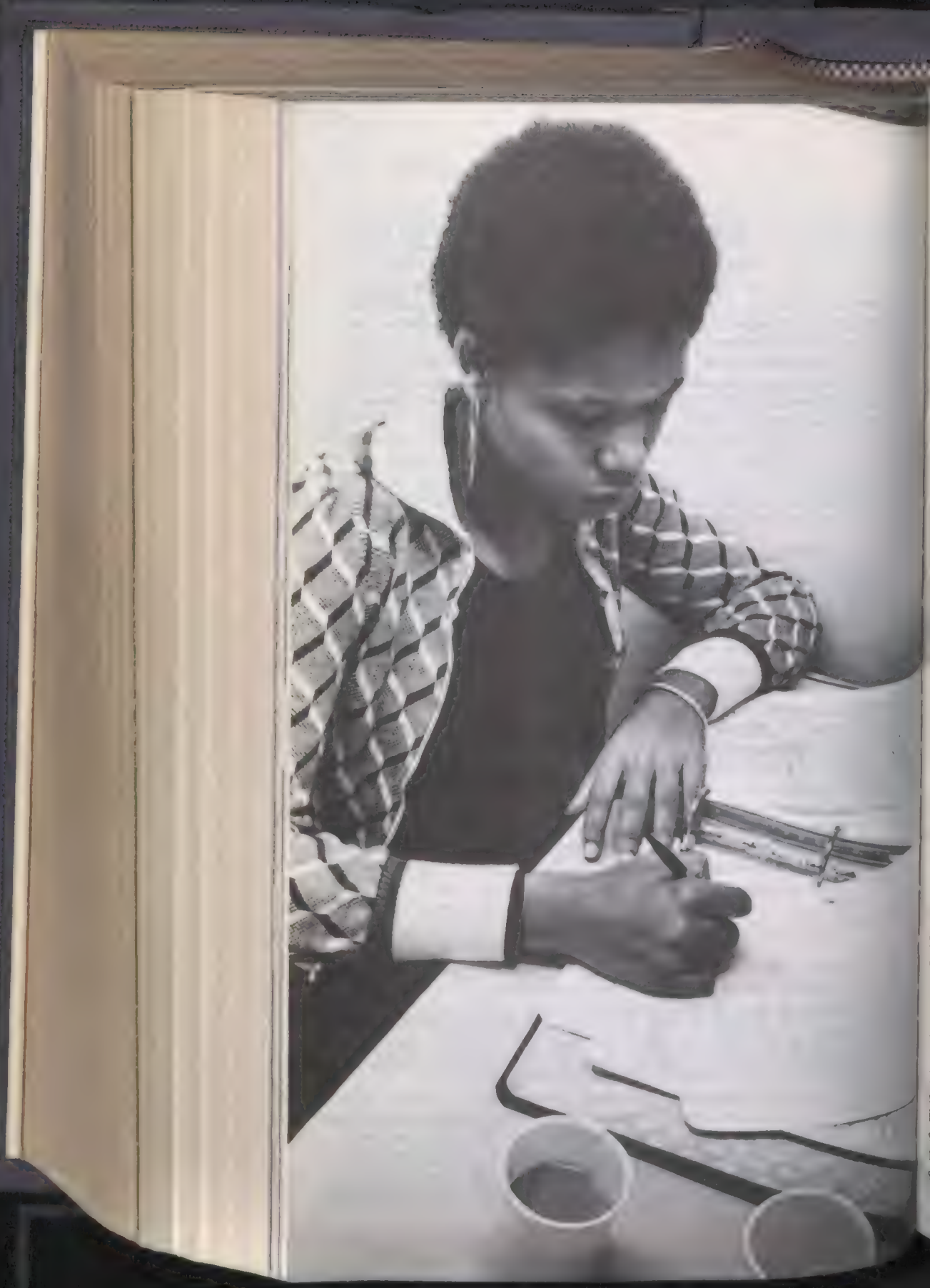
2. Graduates of law schools which are members of the Association of American Law Schools or are approved by the American Bar Association who wish to take advanced courses without pursuing degree programs may be admitted as Unclassified Students.

Unclassified Students participate in the work of the course, take examinations, and have their grades recorded. Credit for work earned as an Unclassified Student may not be applied to satisfy the requirements for a degree program unless express written approval is granted by the Dean at the time of admission.

Continuing Legal Education

MEMBERS OF THE BAR wishing to keep abreast of current developments in the law may register for any of the courses in the National Law Center on a non-credit basis as Continuing Legal Education students. Such students do not take examinations in courses and no grades are recorded for their work.

A simplified admission and registration procedure is used and must be completed on or before the last day of regular registration for the appropriate semester. Continuing Legal Education students pay only the tuition fee on the semester-hour basis. They may not participate in student activities or benefit from the medical privileges of the University. (Continuing Legal Education registrations are subject to cancellation if courses are filled by regularly registered students.)



GENERAL INFORMATION

THE NATIONAL LAW CENTER has an enrollment of about 1,700 for the J.D. and Post-J.D. degree programs. Approximately 1,000 students are enrolled in the full-time day division for the J.D. degree and 400 are enrolled in the part-time evening division. Three hundred students, many from abroad, are enrolled in the Post-J.D. degree programs.

DAY AND EVENING CLASSES

Day classes meet in the mornings in 50-minute periods and in the afternoons in 50-minute periods and also in sessions of two 50-minute periods, Monday through Friday. Trial Practice Court and certain other courses meet for two-hour periods on Saturday mornings.

Evening classes meet from 5:50 to 7:40 p.m., Monday through Friday. A four-credit course, e.g., Evidence, meets two evenings a week; a three-credit course, e.g., Administrative Law, meets two evenings a week for one-half the semester and one evening for the other half; a two-credit course, e.g., Contracts II, meets one evening a week. The evening division conforms to the standards of the day division, the full-time faculty participating in the instruction.

Examinations for both day and evening classes may be given in the afternoon only. Examinations for day students may be given in the evening.

SUMMER TERM

A term of two sessions, with day and evening classes, is offered in the summer. Students may register for either or both sessions. *No beginning students are admitted to the Juris Doctor program in the summer term.*

The summer term is shorter than a semester of the academic year, and, as a consequence, a student must attend two and one-half summer terms to receive residence credit for one academic year or attend one and one-half summer terms to receive residence credit for a semester.

A maximum of 6 semester hours may be taken each session by day students. Day students receive four-tenths of a semester of residence credit for each session of the summer term in which they are registered for 3 or more semester hours. A maximum of 4 semester hours may be taken each session by evening students. Evening students receive three-tenths of a semester of residence credit for each session of the summer term in which they are registered for 2 or more semester hours.

Admission

APPLICANTS ARE URGED to submit application forms and complete creden well in advance of the semester for which they seek admission. In the selec process, there is no discrimination against any applicant because of sex, ra color, religion, or national origin. An application fee of $25 for a degree c didate, $5 for an Unclassified Student, must accompany the application.

Forms for application for admission or readmission are available at t should be returned to the Office of the Dean of the National Law Cent George Washington University, Washington, D.C. 20052.

For further details concerning students from foreign institutions, see pa 22–25.

APPLICATION FOR ADMISSION

Juris Doctor Program.—Beginning students are admitted only at the start the fall semester.

The applicant should register with the Law School Data Assembly Servi (LSDAS) by completing and mailing the registration form supplied with ea application blank. A transcript from each college or university attended sho then be sent directly to LSDAS, Educational Testing Service, Box 944, Prince ton, New Jersey 08540. No transcript should be sent to the National Law Center. The LSDAS will analyze the transcript and send a copy to this la school and others designated on the registration form. If the transcript which has been forwarded to LSDAS does not show evidence of receipt of a Bach lor's degree, the applicant will be asked, upon acceptance, to submit a fina transcript directly to the National Law Center.

To provide time for the evaluation of credentials of beginning students, papers, including the Law School Admission Test score, should be received b the National Law Center before March 1. This means that the October or De cember Law School Admission Test should be taken (see "Entrance Require ments," page 11.

All papers of transfer students should be received by the Office of the De no later than May 1 for the fall semester, December 1 for the spring semester and one month prior to registration for the summer session for which applica tion is made.

For additional information, see the official *Pre-Law Handbook*, 1976–19 edition, available in October, 1976, and prepared by the Law School Admissio Council and the Association of American Law Schools. This book includes material on the law and lawyers, pre-law preparation, applying to law schools and the study of law, together with individualized information on most Amer can law schools. It may be obtained at college bookstores or ordered fro Educational Testing Service, Princeton, New Jersey 08540.

Master's and Doctoral Programs.—Students are admitted at the beginning the fall semester, the spring semester, or any of the summer sessions.

Application for admission, together with all required credentials, must b received by July 1 for the fall semester, December 1 for the spring semes ter, and one month prior to registration for the summer session for which ap plication is made.

Unclassified Students.—Lawyers who wish to take graduate courses are

admitted at the beginning of the fall semester, the spring semester, or any of the summer sessions. Students who wish to earn credits for transfer toward a Bachelor of Laws or Juris Doctor degree at another institution may be admitted to the summer sessions if they are students in good standing at an accredited law school and have shown unusual ability in their law studies; they are admitted to the fall or spring semester only in unusual circumstances.

1. Application for admission, with required credentials, for a student who wishes to earn credits for transfer toward a Bachelor of Laws or Juris Doctor degree at another law school (see page 25), should be received at the Office of the Dean at least one month prior to the first day of registration for the semester or summer session for which application is made.

2. Application for admission, with required credentials, for lawyers who wish to take graduate courses (see page 25), should be received at the Office of the Dean by July 1 for the fall semester, December 1 for the spring semester, and one month prior to registration for the summer session for which application is made.

READMISSION

A student who was previously registered but did not attend during the most recent semester (summer term excluded) should file an application for readmission. Closing dates for readmission are the same as those for admission (see "Application for Admission," page 28).

If the student has attended one or more higher institutions during his absence from the University or if he applies as a degree candidate and was previously a nondegree student, he must have complete, official transcripts sent to the Dean.



Registration

BEFORE ATTENDING CLASSES each student must register in person. No stu
will be registered until proper credentials have been filed and approved
"Admission").

No registration is accepted for less than a semester or one summer session

A student may not register concurrently in George Washington Univers
and another institution. Registration in more than one college, school, or
sion of the University requires the written permission of the deans concern
prior to registration.

ELIGIBILITY FOR REGISTRATION

A student who is suspended or whose record is not clear for any reason is n
eligible to register.

New Student.—Upon receipt of a *final letter* of admission a new student
eligible for registration on the stated days of registration.

Readmitted Student.—A student previously registered who was not register
for courses during the preceding semester or summer session must apply
and receive a letter of readmission (see "Readmission," above) before becom
ing eligible for registration.

TIME AND PLACE OF REGISTRATION

Registration is held in Stockton Hall, 720 Twentieth Street, N.W., during th
following periods: *fall semester,* August 19 and 20, *spring semester,* Januar
6 and 7.

A late-registration fee of $15 is charged each student who is permitted
register after the regular registration days.

Registration may be changed only with the permission of the Dean.



Fees and Financial Regulations

THE FOLLOWING FEES AND FINANCIAL REGULATIONS were adopted for the academic year 1976–77. (See page 32 for projected tuition and fee increases for 1977–79.)

Tuition Fees

All law students except candidates for the degree of Doctor of Juridical Science:	
Full-time program (11 or more hours*), each semester	$1,300.00
Part-time program for all candidates for the degree for Juris Doctor, for each semester hour	98.00
Part-time program for students other than candidates for the degree of Juris Doctor, for each semester hour	100.00
Doctor of Juridical Science,† including the final examination	2,700.00

University Center Fee (nonrefundable)

For students registered for 11 or more semester hours:	
Each semester	50.50
For students registered for less than 11 semester hours in a semester:	
For each semester hour for which the student registers	4.75
For students maintaining "continuous registration" status:	
Each semester	4.75

Graduation Fees

Juris Doctor, Master's, Doctor's degrees	25.00
Fee for binding Master's Thesis	10.00

Residence Hall Fees (See page 47)

Special Fees

Application fee (degree candidate), nonrefundable	25.00
Application fee (unclassified student), nonrefundable	5.00
Application fee for room reservation, nonrefundable	100.00
Tuition deposit fee charged each student admitted to J.D. degree candidacy (payable in two installments—$100, nonrefundable, by a date specified in the letter of admission, $350 by June 1)	450.00
Late-registration fee, for failure to register within the designated period	15.00
Continuous Registration fee, for post-J.D. students, to maintain "continuous registration" during any semester of absence from the University or after completion of tuition requirements.‡ Due and payable on the official days of registration	100.00
Late-payment fee, charged for failure to make payments when due (see "Payment of Fees," pages 32–33)	15.00
Replacement of lost or stolen picture identification card	2.00

* With the prior permission of the Dean, a J.D. degree candidate may take more than 14 semester hours after the first year of study.

† The tuition fee is to be paid at the rate of $675.00 a semester for four successive semesters, exclusive of the summer term or terms. No "continuous registration" fee will be charged if a third year is needed for completion of the degree requirements. If the Faculty should approve an extension of time, the student must maintain continuous registration and pay the continuous registration fee.

‡ The continuous registration fee applies toward neither financial nor residence requirements for the degree. This fee does not apply to students granted military leave (see page 44).

Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 32–33 .....
Returned check fee, charged a student whose check is returned because of insufficient funds or for any other reason .....
Transcript fee, for each transcript of record.....

Registration on campus in the University entitles each student to the follow University privileges: the services of the Student Career Services Office; the of the University Library; gymnasium privileges; admission to all athletic co tests, unless otherwise specified; subscription to the *University Hatchet*, student newspaper; admission to University debates; medical attention as scribed under Student Health Service. These privileges terminate and a dent is no longer in residence upon withdrawal or dismissal from the Univers

PROJECTED TUITION AND FEE INCREASES 1977–79

In order that students and their parents may plan more realistically, tuition creases for the academic years 1977–78, and 1978–79 have been estimated follows:

***Increase by year (full-time students):**

For students enrolled as full-time students in 1975–1976 for the J.D. degree who obtain the degree no later than May 1978—
1977–78 ..... $200
For all other students, including post-J.D. students—
1977–78 500
1978–79 500

Increase by semester hour (part-time students)

For students enrolled in 1975–1976 for the J.D. degree who obtain the degree no later than May 1979—
1977–78 50
1978–79 .....
For all other students, including post-J.D. students—
1977–78 200
1978–79 250

It is not possible to project future economic data with certainty. The in creases outlined above are merely estimates based on present circumstance and should in no way be interpreted as fixed limits on tuition increases. The University hopes to keep tuition increases as low as possible, but it is obligate to maintain a sound financial basis. Economic conditions in the recent past particularly as they affect private educational institutions, have been extreme variable, and significant increases in tuition in excess of the above limits ma be required.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until a charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks an

* These yearly increases are also projected for the total fee for work leading to the degree of Doctor of Juridical Science.

postal money orders should be made out to George Washington University with student identification number shown in upper left hand corner.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 27, 1976 (for the fall semester), and March 9, 1977 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $600.00 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his right to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

PREPAID AND DEFERRED PAYMENT PLANS

Several commercial programs for those who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the Dean. Withdrawal from

* Regulations covering withdrawal and refunds for the summer sessions are stated in the *Summer Sessions Schedules of Classes.*

courses is permitted after the midpoint of a semester only in extraordinary cumstances. Notification to an instructor is not an acceptable notice.

In authorized withdrawals and changes in schedule, cancellations of semes tuition charges and fees will be made in accordance with the following sche ule for the fall and spring semesters:

1. *Complete withdrawal* from the University:

FALL SEMESTER*

Withdrawal dated on or before August 27, 1976.....90 per ce
Withdrawal dated August 30 to September 10, 1976.....75 per ce
Withdrawal dated September 13 to September 24, 1976....50 per ce
Withdrawal dated after September 24, 1976.....none

SPRING SEMESTER

Withdrawal dated on or before January 14, 1977.....90 per ce
Withdrawal dated January 17 to January 28, 1977.....75 per ce
Withdrawal dated January 31 to February 11, 1977.....50 per ce
Withdrawal dated after February 11, 1977.....none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal by a part-time student,* the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in a full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustment of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for complete withdrawal from the University (see No. 1, above). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 44).
5. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be refunded or reduced because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred and will not be credited to another semester (exception: students granted military leave, see page 44).

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

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* No refund of the $100 deposit required of entering students is granted.



Financial Aid

THE NATIONAL LAW CENTER has been able in recent years to assist many students in obtaining the financial aid they require, through full or partial scholarships, various loan programs, part-time employment, or a combination of these kinds of assistance.

GRADUATE AND PROFESSIONAL SCHOOL FINANCIAL AID SERVICE

The National Law Center participates in the Graduate and Professional School Financial Aid Service (GAPSFAS), which provides an analysis of an applicant's financial needs. Entering students wishing to receive financial aid should request the materials from GAPSFAS, Education Testing Service, Box 944, Princeton, New Jersey 08540. The information provided by the applicant and the applicant's parents will be analyzed, and a copy of the report will be sent to the Law Center. In addition, students entering the National Law Center who desire to be considered for a scholarship must submit a letter to the Law Center by March 1 outlining their academic qualifications, their extracurricular activities, and their reasons for believing a scholarship award to them is justified.

Students needing financial assistance should file with GAPSFAS in time for their reports to be received at the Law Center as early as possible since the Committee on Student Financial Aid of the Center will begin making awards in March, and available funds are limited.

No awards will be made to an entering student until his admission has been finalized.

JURIS DOCTOR PROGRAM

Scholarships and Research Assistantships

Application and correspondence concerning scholarships and research assist-antships should be sent directly to the Dean. Unless otherwise specified, appli-cation and supporting credentials should be submitted no later than March preceding the period for which the award is made.

Arent, Fox, Kintner, Plotkin & Kahn Scholarship (1973).—Scholarship aid for needy law students from the Washington, D.C., area.

Mildred Gott Bryan Scholarship Fund (1965).—Partial scholarship aid for students in the National Law Center.

Charles Worthington Dorsey Memorial Scholarship (1947).—Memorial to Charles Worthington Dorsey, LL.B. 1881, LL.M. 1882. A full-tuition scholar-ship for the course leading to the degree of Juris Doctor, awarded to a needy and promising graduate of this University with a Bachelor of Arts or equiva-lent degree. Ordinarily this scholarship is awarded once every three years.

Honor Scholarships.—Two scholarships available each year to students enter-ing upon full-time study. Each scholarship provides a cash award for the first year, in addition to tuition aid, in an amount depending on need, for all three years. These scholarships are awarded on the basis of outstanding college rec-ords, both academic and extracurricular; Law School Admission Test scores and need. To retain the scholarship for the second and third years, the candi-dates must maintain a *B* average, both for each year and cumulative.



Law Center Tuition Remission.—For students from minority groups, based on financial need.

Phi Delta Delta Scholarships (1959).—Zeta Chapter of Phi Delta Delta Legal Fraternity (International), provides tuition aid to a student in the second year of the Juris Doctor program who excelled in scholastic achievement and service to the Center in the first year.

Trustee Scholarships.—Scholarships awarded each year to entering students, for tuition aid, in an amount depending on need, in the morning division. Candidates must have demonstrated qualities of leadership in addition to scholastic attainment. To retain the scholarship, the successful candidate must maintain a *B* average, both for each year and cumulative. Application must be made to the Dean before March 1.

Tuition-aid scholarships are also available to continuing second- and third-year full-time students with demonstrated scholastic ability, on the basis of financial need and capacity for leadership. Application should be made to the Dean prior to June 1.

Frank S. Whitcomb Scholarship Fund (1971).—Bequest of Frank S. Whitcomb for the purpose of aiding and assisting worthy young men and women in securing a legal education.

Graduate Fellowship Information Center.—Students may also wish to visit the Graduate Fellowship Information Center (2025 H St., N.W.) for additional information on fellowships and grants.

Loan Funds

Through the generosity of friends of the University a number of loan funds are available. Among them are the Robert Ash Loan Fund; the George R. Beneman Loan Fund; the Morris and Gwendolyn Cafritz Foundation Minority Law Student Loan Fund; the Robert M. and Mary McConnel Cooper Loan Fund; the Robert McKinney Cooper Memorial Loan Fund; the District of Columbia Bar Association Loan Fund; the J.W. Ehrlich Foundation Loan Fund; the Newell W. Ellison Loan Fund; the Harold L. and Violet George Foundation Loan Fund; the George Washington Law Association Loan Fund; the Jephson Educational Trust Loan Fund; the Law Association Loan Fund for the law classes of 1912, 1918, 1921, 1924, 1929, 1931, 1933, 1935, 1936, 1937, 1938, 1939, 1941, 1942, 1945, 1950, 1951, 1952, 1953, 1955, 1959, 1960, 1961, 1962, 1963, 1964, 1965; the Oscar Lawler Memorial Loan Fund; the Horace L. Lohnes Memorial Assistance Fund; the Jessie B. Martin Loan Fund; the Mike Pelekiri Loan Fund; the W. Theodore Pierson Loan Fund; and the Orville Hassler Walburn Memorial Loan Fund.

In addition, financial assistance is available through the Guaranteed Student Loan Program, National Direct Student Loans, the American Bar Association Loan Program, and other sources.

Application for financial assistance should be made in the Office of the Dean.

MASTER'S AND DOCTORAL PROGRAMS

Fellowships and Scholarships

Application should be made before March 1 preceding the period for which the award is made. The applicant should submit an application for admission

as a degree candidate and a personal letter applying for a fellowship to t Dean. The letter of application should contain complete biographical da information as to experience in practice or teaching, and copies of or citatio to published legal writings, and such other information the student believes w be of assistance in the consideration of the application. Applicants shou arrange for letters of recommendation to be sent from two members of the law faculty directly to the Dean. The applicant's academic rank in class shou be included either in the transcript of the law school or in the letters o recommendation.

Teaching Fellowships.—Two or three fellowships available each year with stipend of $8,000 plus tuition for an approved course of study leading to advanced degree. Teaching fellowships are awarded for a term of two ac demic years. Fellows conduct the first-year course in Legal Research and Wri ing and work with the students to improve their legal writing ability. B arrangement with the Dean, they may also be given the opportunity to tea additional courses.

Richard Paul Momsen Scholarships for Brazilian Graduate Law Students.— Bequest of Richard Paul Momsen, LL.B. 1912. Awarded 1976–77 and alter nate years, for the study of U.S. constitutional law and the law of patents and trademarks.

Prizes

Jacob Burns Prize.—Established by Jacob Burns, a law alumnus and Trustee of the University. A medal and $100 awarded annually to each of the two members of the winning team in the upperclass Van Vleck Moot Court com petition.

Ogden W. Fields Graduate Prize.—Fifty dollars awarded annually to the graduate student who has demonstrated the highest overall proficiency in a course in labor law.

Charles Glover Prize.—Established by Charles Carroll Glover, Jr., an Hon orary Trustee of the University, in memory of his great-grandfather, an illustri ous member of the bar of the District of Columbia. Consists of selected law books. Awarded annually to the student who has attained the highest average grade in the third-year, full-time course.

Kappa Beta Pi Prize.—Awarded by Eta Alumnae Chapter to the woman law student who attains the highest average for the first year.

John Bell Larner Prize.—By bequest, a medal awarded annually to the member of the graduating class who attains the highest average grade in the entire course for the degree of Juris Doctor.

John Ordronaux Prizes.—By bequest, $75 awarded annually to the student who has attained the highest average grade in the first-year full-time course and $75 to the student who has attained the highest cumulative average grade at the end of the second-year, full-time course.

United States Law Week Award.—Presented to an outstanding senior law student.

Jennie Hassler Walburn Prize.—A cash reward to the outstanding student in the field of civil procedure, established by the will of the late Professor Orville Hassler Walburn in memory of his mother.

ACADEMIC WORK LOAD

Juris Doctor Candidates.—Juris Doctor candidates without substantial outside employment may take a program of studies of 14 hours a week. Such students may take courses in the evening only if they are not scheduled in the daytime and if a majority of the hours taken are in day courses. The Dean is authorized to approve programs of study of more than 14 hours in exceptional cases; however, no program will be approved which would permit the student to complete requirements for the degree in less than 28 months after beginning the first year of law study. Students with 20 hours or more of outside employment, whether in the day or evening division, must take a limited program of studies not exceeding 10 hours a week. Students taking a majority of their classes in the evening may not take more than 10 hours a week: the minimum load is 8 hours, except in special cases where 6 may be approved by the Dean for a limited time. A minimum schedule of 11 hours in the day division is required except in exceptional circumstances when a reduced program is authorized by the Dean.

Students taking more than 8 hours in the day division or 4 hours in the evening division must have the permission of the Dean to take a Bar Review course.

Students may transfer from the day division to the evening division only with the permission of the Dean.

With the approval of the Dean, second- and third-year students may take a maximum of 6 semester hours of appropriate courses in other departments of the University; such a student must receive a grade of at least *B* to obtain credit for such courses, and in no event will the grade count in computing the cumulative average.

Master's Candidates.—Master's candidates without substantial outside employment may take a maximum of 12 hours a week. Students with 20 hours or more of outside employment must take a limited program of study not to exceed 8 hours a week. The minimum load is 4 hours unless approval for fewer hours is given by the Dean for a limited time.

ATTENDANCE

Regular attendance at classes is required and is necessary for successful work. A student who is deficient in class attendance in any course may be barred from taking the examination.

CHANGES IN PROGRAM OF STUDIES

A student may not add courses or change from one section to another of the same course without the approval of the Dean. Students may drop courses only with the written approval of the Dean. In addition, approval of the instructor is ordinarily required unless the request is made early in the semester. Under no circumstances may any student drop a course after the last day of classes in any semester or summer session.

RESEARCH PAPERS

The preparation of a research paper is required in lieu of an examination in seminars and in other courses, as indicated in the course descriptions. A research paper must be submitted by the first day of the examination period (the first day any examination is given in any course). For sufficient reason the instructor may extend the time beyond this date to a later date, subject to the following conditions: (1) no student will receive any credit for the course for any purpose until a paper acceptable to the instructor has been submitted; (2) if a paper is submitted after the last day of examinations (or the last Wednesday before registration for the spring semester), the only grade the student may receive for the course is *CR* (Credit) or *NC* (No Credit), except that failure ultimately to submit any paper for the course will result in a grade of 45. Students who are candidates for the J.D. degree may register for one such course in each semester of their third year; with the approval of the Dean such students may register for more than one such course each semester. Approval of the Dean is required for second-year students to take such courses.

EXAMINATIONS

Written examinations are held at the end of most courses. Every student is required to take the regular examinations unless excused. No excuse for absence will be granted except by the Dean and then only for illness or other emergency. Application for excuse must be made in writing not later than one month after the date of the examination. A student excused from a final examination will be permitted to apply to the instructor for a Credit/No Credit determination. The instructor will select the mode of determination (for example, a make-up examination or paper). The student will have the option of (1) complying (prior to the completion of the semester following the excused absence) with the instructor's procedure of determining Credit/No Credit, or (2) having the grade *I* (Incomplete) entered on the record and taking the next regularly scheduled examination for a numerical grade. The examination may not be taken after exclusion for low scholarship.

Permission to take an examination before the regularly scheduled date will not be granted. Permission to take a postponed examination is limited to the situations provided for in the preceding paragraph.

A student who has been excused from taking a regular examination and who is a candidate for a degree to be conferred prior to the next regular examination in the subject may petition the Scholarship Committee, which may authorize such action as the circumstances require.

If a student fails to take an examination, a grade of 45 will be recorded unless the student has been excused from the examination as provided above or has obtained the Dean's permission to drop the course.

CREDIT/NO CREDIT OPTION

Candidates for the degree of Juris Doctor may take, in addition to courses regularly given on a "Credit/No Credit" basis, 12 semester hours of elective course work on a "Credit/No Credit" basis, and will receive a grade of "Credit"



if the course is satisfactorily completed with a grade of 65 or better. No student may change from a numerical grade to a "Credit/No Credit" basis in a course during the last four weeks of classes except with the permission of the instructor. An unexcused failure to take an examination in a course or failure to submit a required research paper will result in the recording of a grade of 45 for a course taken on a "Credit/No Credit" basis.

No student may take more than 17 semester hours of courses (including Law 220 and also courses regularly given on a "Credit/No Credit" basis) on a "Credit/No Credit" basis.

Students are advised to consider carefully the advisability of electing to take courses on a "Credit/No Credit" basis. In the opinion of the faculty, a student's election to take courses on a "Credit/No Credit" basis may, in view of the importance apparently attached to grades by educational institutions and employers, be detrimental to the student's career in the legal profession.

GRADES

Grades are given in numerical terms equivalent to letter grades as follows: 85–100, *A*, Excellent; 75–84, *B*, Good; 65–74, *C*, Satisfactory; 55–64, *D*, Poor —below standard for graduation; 45–54, *F*, Failure. In courses Law 220, 321–2, 323, 342, 343, 345, 346, 385, 399, 459, 479, 487, 509, 579, and 593 grades are *CR*, Credit; *NC*, No Credit. A student who has been excused from failure to take a regularly scheduled examination is given the grade of *I*, Incomplete. See "Examinations" (page 40) for grade upon failure to take an examination. Grades between 55 and 100 indicate that the work has been completed and credit given. Grades between 55 and 64, however, do not represent satisfactory work and adversely affect a student's cumulative average. No

credit is given to J.D. candidates for grades below 55 or to post-J.D. can dates for grades below 65. No grade may be changed by an instructor af it has been posted in the law school or disclosed to a student unless there h been an error in arithmetic certified in writing as such by the instructor.

Any student who receives a grade below 55 (*F*) has the right to retake th course once, from the same or a different instructor, but only within the ne academic year. (This does not apply to post-J.D. students.) The grade re ceived in the retaken course shall be entered into the student's record in addition to the original grade, and both grades shall be included in computin the student's average. A student may exercise the right to retake a course only with respect to two different courses during study at the Law Center.

The cumulative average of a student includes all grades in all courses take while a candidate for a particular degree. When a course is repeated (see "Academic Dishonesty," page 44), both the first grade and the subsequent grade or grades are counted in the cumulative average.

EXCLUSION AND PROBATION FOR POOR SCHOLARSHIP

Candidates for the Degree of Juris Doctor.—A student whose cumulative average at the end of any semester falls below 65.0 but is above 64.0 will be put on probation. If such a student fails to raise the cumulative average to 65.0 at the end of the next semester, the student will not be permitted to register for any succeeding semester unless the student petitions for and re ceives the permission of the Scholarship Committee.

A student whose cumulative average at the end of any semester falls below 64.0 will not be permitted to register for any succeeding semester unless the student petitions for and receives the permission of the Scholarship Committee to register.

A student who fails more than one course over the entire period of law study will not be permitted to register for any succeeding semester or to graduate un less the student petitions for and receives the permission of the Scholarship Committee.

A student who is not permitted to register under the foregoing provisions will be excluded as of the beginning of the semester for which the student was ineligible to register.

Students who are registered at the time they receive notice that they will not be permitted to register for the next semester are entitled to withdraw from school and to receive a full refund of the tuition paid for the semester, or to complete the work for which they are registered.

Any student excluded may petition for reinstatement; if the student can demonstrate that the low grades were due to circumstances beyond the student's control and that the student has the capacity to pursue the study of law with a definite likelihood of success, that student may be readmitted subject to such conditions as may be imposed by the Scholarship Committee.

Despite the above provisions, a student will be allowed to complete the first two semesters of law study before being denied permission to register for a succeeding semester.

For this purpose the term "semester" includes a session of the summer term.

Candidates for Masters' and Doctoral Degrees.—A candidate for a master's or doctoral degree whose work is not satisfactory in the opinion of the faculty

taking into consideration the requirements and standards for the degree, may, by action of the faculty, be excluded at the end of the semester for which the candidate is currently registered.

A cumulative average of 78 (see page 20) is required for the Master of Laws degree. A student whose cumulative average falls below 78 at anytime will be ineligible for continuation in the program without the permission of the Dean. Such a student will not be permitted to register for any succeeding semester unless the student petitions for and receives the permission of the Dean or the Board for Graduate Studies.

Unclassified Students.—An unclassified student whose work is not satisfactory may be excluded at the end of the semester for which the student is currently registered.

SUMMER SCHOOL CREDIT

Students planning to attend summer school sessions at other law schools and desiring to use credits obtained at such schools in their Juris Doctor program at this Center must first have the courses they wish to take approved by the Dean. Students may not take courses in summer sessions at other law schools in this vicinity if these same courses are being given during the Summer Sessions at the National Law Center. In no event will credits be given for unsatisfactory work or be recognized in excess of those which might be obtained in a similar period in this program.

TRANSCRIPTS OF RECORD

Official transcripts of student records will be issued on request of the student or former student who has a clear financial record. A fee of $2 is charged for each transcript. When more than two transcripts are ordered at the same time, a $2 fee is charged for each of the first two transcripts and a $.50 fee is charged for each additional transcript.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* degree requirements are satisfied. By failing to register for one semester or more, the student breaks his registration and must be readmitted (see "Readmission," page 29). A "Readmitted Student" is required to satisfy the curriculum requirements existing at the time of his readmission. Post-J.D. students who have completed course registration may maintain continuous registration by paying the "continuous registration" fee (see page 31); *J.D. degree candidates may not maintain continuous registration by paying the "continuous registration" fee.*

GRADUATION REQUIREMENTS

Diplomas are awarded in February, May, and September.

To be recommended by the Faculty for graduation, a student must have met the admission requirements of the National Law Center; completed satisfac-

totally the scholarship, curriculum, residence, and other requirements for the degree for which the student is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session at the close of which the degree is to be conferred.

Application for Graduation.—An "Application for Graduation" form must be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal commencement) September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

ACADEMIC DISHONESTY

The University community, to fulfill its purposes, must establish and maintain guidelines of academic behavior. All members of the community are expected to exhibit honesty and competence in their academic work. Incoming students have a special responsibility to acquaint themselves with, and make use of, all proper procedures for doing research, writing papers, and taking examinations.

Members of the community will be presumed to be familiar with the proper academic procedures and held responsible for applying them. Deliberate failure to act in accordance with such procedures will be considered academic dishonesty. Acts of academic dishonesty are a legal, moral, and intellectual offense against the community and will be prosecuted through the proper university channels.

Copies of the University policy on academic dishonesty can be obtained from the following offices: all department chairmen, all academic deans, and the Vice President for Academic Affairs.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to the Dean of a copy of the military orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, the student must apply for readmission to the University well in advance of the semester of expected return. Payments for tuition and fees which are not refunded to the student at the time military leave is granted will be maintained as a deferred credit on the student's account and use upon return to the University.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

The Family Educational Rights and Privacy Act of 1974 applies to institutional policies governing access to and release of student education records maintained by educational institutions which are recipients of federal funds. The University complies with this statute, which states, in part, that such institutions must:

1. afford students access to education records directly related to them;
2. offer students an opportunity for a hearing to challenge such records as inaccurate, misleading, or otherwise inappropriate;
3. receive the student's written consent before releasing information from his or her education records to persons outside the University, except for directory information as indicated below. Personally identifiable information may be furnished to a student's parents without such written consent only upon certification of the student's financial dependency; and
4. comply with judicial order or lawfully issued subpoena to release a student's record notifying this student of the action.

The University will release the following directory information upon request: address; telephone number; dates of attendance; school, college, or division of enrollment; field of study; credit hours earned; degrees earned, and honors received. A student who does not wish such directory information released must file written notice to this effect in the Office of the Registrar.

University guidelines on the release of student information may be obtained from the Office of the Registrar.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO DISMISS STUDENTS

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, the student's registration may be canceled and the student will be ineligible (except by special action of the Faculty) for subsequent registration. The right is reserved by the University to dismiss or exclude any student from the University or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "Lost and Found" Office is maintained on campus in the Safety and Security Office.

RECENTLY ESTABLISHED REGULATIONS

The Appendix (pages 98–100) contains regulations recently approved by the University's Board of Trustees.



Center for Administrative and Academic Computing

Director J.E. Smith

THE CENTER FOR ADMINISTRATIVE AND ACADEMIC COMPUTING is located on the third floor of Lisner Hall, 2023 G St., N.W. The computer and other operational supportive services are located on the first floor of Stuart Hall, 2013 G St., N.W. These facilities normally are available 24 hours a day, seven days a week to all qualified faculty, staff and students.

The Center provides computational facilities and services to academic research and administrative users. The Center staff conducts seminars, consults with users and provides operational assistance as required. The central processing unit is an IBM 370/145 with card reading capability, on-line disk storage, eight high speed and density tape units, two printers and remote entry device for quick turnaround. The operating system is a modified OS/VS with most of the commonly used compilers and a large library of programs.

Computer programming courses are offered by the School of Government and Business Administration, the Department of Statistics, and the School of Engineering and Applied Science. In addition, many other departments offer courses that utilize the computer as a research adjunct to course work.

RESIDENCE HALLS

For the fall of 1976, the University will be able to provide limited regular residence hall space for graduate students. However, the Housing Office operates an Off-Campus Housing Resource Center, and attempts to provide information and assistance for those seeking accommodations. For complete information on this service, as well as apartment guides and referrals, interested applicants should contact Director of Housing, George Washington University, Washington, D.C. 20052.

FOOD SERVICE

Contract food service is available from August to May, and is based on the undergraduate academic calendar of registration, exams, and vacation periods. Alternative accommodations for the law school calendar are made. The rate for the seven-day, 20 meals per week plan has been set at $800. The 15 meals per week, Monday through Friday, plan has been set at $746. The 10 meals per week, Sunday through Saturday, plan has been set at $626. Contract service is cafeteria style and provided in two residence halls and the Cloyd Heck Marvin Center.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

The Center Governing Board, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. This Board works closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

STUDENT HEALTH SERVICE

The Student Health Service is an outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians and physician assistants are available by appointment from 9 a.m. to 4:45 p.m., Monday through Friday. In addition, physician assistants are available for primary care and triage to walk-in patients Monday through Friday from 5 to 6:45 p.m. and on Saturday from 9 a.m. to 12 noon.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently en-

rolled or who has severed connection with the University is ineligible fo medical benefits of the Student Health Service. Any student who so desir may engage physicians and nurses of his or her own choice, but the studen will be responsible for all the fees charged. The bills incurred from all service rendered outside of the Student Health Service (for example, X-ray work laboratories, and referrals to specialists or other outside physicians) are t responsibility of the student.

Health and Accident Insurance

The Student Health Service Office has arranged for and endorsed group healt and accident insurance, on an elective basis, for those *full-time* students wh do not have other coverage. Interested students should contact the Studen Health Service Office.

STUDENT EMPLOYMENT

The Law Center helps in the placement of its students and maintains a place ment service for that purpose. In addition, the Student and Alumni Caree Services Office, Woodhull House, 2033 G Street, N.W., provides assistance t students seeking full-time, part-time, or temporary employment. This Office maintains a registry of positions available and refers qualified applicants for consideration. Information is also available on Civil Service examinations.

A student taking more than 10 semester hours must limit outside employ ment to less than 20 hours (see "Academic Work Load," page 39). It is urged that full-time students refrain from engaging in outside employment during their first year. Although work in some special areas may contribute to the learning and experience of the student, as a general rule it will compete with time needed for adequate study and preparation, which are at the heart of a good legal education.

PLACEMENT SERVICE

The Law Center takes a continuing interest in the placement of its graduates in private practice and governmental service as well as with industry and com merce. The Dean, the Faculty, and the Placement Office cooperate in collect ing information from alumni, law firms, and government agencies concerning opportunities in legal positions throughout the country. Senior law students and recent graduates are urged to keep in touch with the Placement Office.

VETERANS EDUCATION

The veterans counselor in the Office of the Registrar, Luther Rice Hall, 21[illegible] Eye Street, N.W., assists students entitled to educational benefits as veterans, widows, or children of deceased or totally disabled veterans with any problems which may arise concerning their benefits. This Office also processes certifica tion of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or dependents of veterans should consult with the veterans counselor prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 941 N. Capitol St., N.E., Washington, D.C. 20421.



COURSES OF INSTRUCTION

THE COURSES OF INSTRUCTION listed below are subject to change. The Univer
sity reserves the right to withdraw any course announced.

The number of hours of credit given for the satisfactory completion of
course is indicated in parentheses after the name of the course. Thus, a ye
course giving two hours of credit each semester is marked (2–2), and a semes
ter course giving two hours of credit is marked (2).

In most courses, a final examination is held during the examination period
and the grade in the course is determined in large part by that examination.
These courses are parenthetically marked "Examination."

Courses that require the preparation of a major research paper in lieu of an
examination are parenthetically marked "Research Paper." The satisfactory
completion of such a paper by a student individually will satisfy the Legal
Writing curriculum requirement for the J.D. degree.

Courses parenthetically marked "Problem Assignments," "Writing Assign
ments," "Take-home Examination," "Choice of Paper or Examination," or
"Clinical Work" indicate the nature of the method planned by the instructor
for determining in major part the grade he will give for the course. A course
marked with any of these designations will not satisfy the Legal Writing curric
ulum requirement for the J.D. degree.

Day classes begin at 9:10 a.m. and run throughout the entire morning and
afternoon. Evening classes begin at 5:50 p.m. Many examinations for both
day and evening classes may be given in the afternoon only. Examinations for
day students may be held in the evening.

A parenthetical designation at the end of a course description indicates
whether the course is scheduled to be offered in the spring or fall semester or
in the summer sessions, and also usually whether it will meet in the day or
evening. When a double-numbered course is designated "Academic year," the
first half of the course is scheduled to be offered in the fall, the second half
in the spring. Courses with no parenthetical designation indicating time of
offering are not scheduled to be given during the 1976 summer sessions or the
1976–77 academic year.

Courses for Juris Doctor Candidates

Required courses are numbered from 201 to 300. Courses numbered from 301
to 400 are normally taken by second- and third-year students. Courses num
bered from 401 to 600 are generally more advanced. Second-year students

may take courses numbered above 400 only with the permission of the Dean. Third-year students are encouraged to take one course numbered above 400 each semester, and may take more than one such course with the permission of the Dean.

The following courses are among those offering clinical work: Law 343, 345, 346, 394, 396, 399, 458, 459, 479, 508, 509, 579.

REQUIRED COURSES

203–4 **Contracts I–II** (4–2) Nash, Cibinic, Pock, Ginsburg

Legal remedies of contracting parties, including damages in contract and quasi-contract, specific performance, reformation, recission, remedies in tort; acts creating and terminating contractual rights, including offer and acceptance, mistake, problems of proof; function of consideration; conditions; assignments; third-party beneficiaries; effect of changed circumstances; protection of the client's interests upon breach or threat of breach by the other party. Emphasis on problems of analysis, draftsmanship, adversary method. (Examination) (Academic year—day and evening)

207 **Torts** (4) Seidelson, Park, Banzhaf, Schwartz, Sirulnik

Liability for harm to person or property. Intentional torts, negligence, nuisance, products liability, misrepresentation, defamation, and invasion of privacy; fault and other basis for shifting losses; causation; damages; effects of liability insurance; problems under Federal Tort Claims Act. (Examination) (Fall—day and evening)

211 **Property** (4) Starrs, Schiller, Brown, Reitze

Basic concepts of personal property. Real property: historical background of the law of estates and conveyancing, types of estates, dower and curtesy, landlord and tenant relationship, concurrent estates, future interests at common law and after the Statute of Uses; introduction to modern conveyancing—the real estate contract, the deed, the recording system, methods of title assurance. (Examination) (Fall—evening; spring—day; summer 1976)

212 **Constitutional Law** (4) Miller, H. Green, Mayo, Barron, Park

Basic principles of American constitutionalism; judicial function in constitutional cases; implementation of doctrines of separation of powers, federalism, limited government; development and exercise of national powers; introduction to civil rights and liberties. (Examination) (Spring—day and evening)

215 **Criminal Law and Procedure** (4) Starrs, Robinson, Ferster, Sirulnik

Origin and purposes of criminal law; elements of criminal liability; mental disorders; crimes against the person, property, and against both; statutory offenses; criminal procedure, with consideration of Federal Rules of Criminal Procedure. (Examination) (Fall—day; spring—evening)

218 **Civil Procedure** (4) Sharpe, Schwartz, Park, Kayton, Barron, Smalls

Mechanics of litigation—rules which govern the process by which rights and duties studied in substantive law courses are enforced; pleadings, discovery, pre- and post-trial motions, jurisdiction and venue, equity jurisdic-

tion and trial by jury, former adjudication. Emphasis on Federal Rule of Civil Procedure, but principles and main problems indigenous to al procedural systems are developed. (Examination) (Spring—day and evening)

220 **Legal Research, Writing, and Professional Responsibility and Ethics** (2) Seidelson and Staf

Introduction to and practical experience in the use of a law library; in struction and practice in legal writing, including a memorandum and appellate court brief; instruction and experience in the preparation and argument of an appellate court case; instruction in questions of profes sional responsibility and ethics. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. For credit, a student must attain a mini mum grade of 65. (Fall—day and evening)

232 **Evidence** (4) Seidelson, Robinson, Albert, Pari

Preparation and presentation of evidence, including proof of writings qualification and examination of witnesses with emphasis on impeachment privilege; opinion testimony; determination of relevancy; demonstrative experimental, scientific evidence; application of the hearsay rule. (Exami nation). (Spring—day and evening; summer 1976)

ELECTIVE COURSES

302 **Admiralty** (2) Sharpe

American practice and jurisdiction in admiralty; saving clause actions at law. Substantive maritime law of title and possession, maritime liens, personal injury and wrongful death, charter parties and bills of lading, general average and salvage and marine insurance, collisions. Lawmaking methods: judge-made law, statutes, international commerical custom, and treaties. (Examination) (Spring—day)

303 **International Law and World Order** (3) Mallison

(Formerly Law 305)

An introduction to international law which provides the background for the study of specialized seminars; emphasis on national states as participants in decision-making processes with consideration also of in dividuals; analysis of range of available sanctions; roles and effects of international agreements under United States Constitution; introductory study of the World Bank. Complements but does not repeat material in Law 304. (Examination) (Fall—day and evening; summer 1976)

304 **United Nations Law and World Order** (2) Mallison

Introduction to international law through study of law and practice of United Nations Charter; structure and process of decision of United Na tions; maintenance of international peace and security—peaceful settle ment of disputes and national and collective self-defense; including cur rent problems considered by the United Nations. Complements but does not repeat the material in Law 303. (Examination) (Spring—day and evening)

307 **Comparative Law** (3) Albert, Liebesny

A general introduction to the world's main legal systems with emphasis on civil law. Comparative study of the administration of justice, pro cedural problems, and selected substantive legal institutions. (Exami nation) (Spring—day)

309 **Conflicts of Laws** (3) **Seidelson, Pock, D. Green, Smalls**

Legal problems arising from occurrences transcending state or national boundaries; jurisdiction; foreign judgments; constitutional influences; theoretical bases of choice of law principles and their application to specific fields, including torts, contracts, property, family law, administration of estates, business associations. The grade *CR* (credit) or *NC* (no credit) only is given in sections taught by D. Green. Green (Problem Assignments) Seidelson, Pock (Examination) (Fall—evening; spring—day; summer 1976)

311 **Agency and Partnerships** (2) **Sharpe, Schiller**

Employment relations, vicarious liability of employers for employees' torts, scope of employment, and independent contractors; agents' authority and apparent authority to contract for their principals, ratification; nonprofit associations; the formation, operation, and termination of partnerships; limited partnerships. (Examination) (Fall—day and evening)

312 **Corporations** (4) **Kirkpatrick, H. Green, Stevenson**

Corporate law, with emphasis on operations and financing of corporations. Control of corporations, action by corporate directors, officers, shareholders. Control devices. Directors' and shareholders' duties of care and loyalty, insiders' transactions in shares of the corporation. Derivative suits, kinds of shares, dividends, corporate distributions. (Examination) (Fall—day; spring—evening; summer 1976)

313 **Sales and Sales Financing** (2) **Albert, Rothschild, Ginsburg**

Provisions of the Uniform Commercial Code relating to sale and distribution of goods, including bulk transfers, warehouse receipts, bills of lading, and other documents of title; particular attention to secured transactions and financing devices utilized in this connection. (Examination) (Fall—day and evening)

314 **Commercial Paper, Check Collection, and Banking** (2) **Albert, Rothschild, Schwartz, Ginsburg**

Classic view of negotiable instruments as codified by Article III of the Uniform Commercial Code. Check collection: the system in theory as expressed in Article IV of the Uniform Commercial Code and the system in practice; Federal Reserve regulations, Clearing House agreements, and automation systems. The dual banking system, work of the Comptroller General and the Federal Reserve Board. Legal problems concerning interest and the checkless society. (Examination) (Spring—day and evening; summer 1976)

318 **Creditors' Rights** (3) **Kirkpatrick**

Creditors' remedies outside bankruptcy—compositions, agreements, general assignments; bankruptcy proceedings under the federal statute, administration, discharge, the position and powers of the trustee, preferences; corporate reorganization under Chapter X of the Bankruptcy Act. (Examination) (Fall—day and evening)

321–22 **Current Decisions** (2–2)

Limited to members of the student staff of the *Law Review*. A maximum of 4 semester hours of credit may be earned in this course. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Academic year—day and evening)

323 Journal of International Law (1 or 2)

Limited to editors of the student staff of the *Journal of International L and Economics*. The grade *CR* (Credit) or *NC* (No Credit) is given this course. (Fall and spring—as arranged)

325–26 Trusts and Estates I–II (3–3) Weaver, K

Noncommercial transfers of wealth at death or during life. Law essential elements and formalities for creation of trusts and executio wills, revocation and alteration, grounds for contest, limits on prop owner's power to control, intestate succession. Law 326: dispos provisions, common questions of construction, future interests probl administration of estates and trusts, charitable trusts. Prerequisite to L 325: Law 211; to Law 326: Law 325. (Examination and Problem signments) (Law 325: fall—day and evening; summer 1976. Law spring—day and evening)

327 Modern Real Estate Transactions (2) Brown, Sch

Advanced problems in purchase and sale of real estate: legal responsibi and functions of buyer, seller, broker, escrow agent, conveyancing att ney, title examiner, abstractor, insuror of title; process of examination assurance of title and other interests in realty, including recording, re tration and title insurance systems, settlements and closings, warranti hazard insurance; emerging problems related to cooperatives, condom iums and property-owners' associations; problems related to compli with subdivision, zoning, building and housing code regulations. (Ex nation) (Spring—day)

329 Unfair Trade Practices (3) Weston, Harris, Ban

Unfair trade practices at common law and under statutes; trademar trade names; copyright law; misappropriation of ideas; protection of co petitors and consumers against false advertising under Federal Tr Commission Act; resale price maintenance under state Fair Trade A state sales-below-cost statutes; Robinson-Patman Price Discrimination A miscellaneous business practices. (Examination) (Fall—day evening)

330 Federal Antitrust Laws (3) Weston, Kirkpatr

Sherman and Clayton Acts, related statutes. Price-fixing agreements other types of trade restraints considered under Section 1; monopoli considered under Section 2 of the Sherman Act. Mergers and tie-in sa other activities under the Clayton Act. All types of business conduc raising questions under the antitrust laws, including trade association tivities, exclusive-dealing arrangements, boycotts, patents and copyrig (Examination (Spring—day and evening)

331 Product Liability (2) Schwa

Development of the concept of product liability and consumer's remedi Specific problems and processes in evaluation of risk and benefit countered in government regulation of dangerous and defective produc Survey of civil actions for harm resulting from defective and dangero products with reference to parties and proof in negligence, warranty, n sance, fraud, misrepresentation, and other cases. Problems associated w hazard identification, insurance, and industry self-regulation. Review Consumer Product Safety Act and current legislation dealing with juries and remedies in specific areas. (Choice of Research Paper Examination) (Fall—day)

332 **Federal Jurisdiction** (2) Albert, D. Green, Barron, Smalls

Relationship of federal courts to Congress and to the states, through analysis of cases dealing with federal judicial functions (including problems of advisory opinions, standing to litigate, justiciability), federal questions in federal courts, federal review of state court decisions (including relation between state and federal substantive law, procedural problems in exercising review, application of law to fact). The grade *CR* (credit) or *NC* (no credit) only is given in sections taught by D. Green. Albert—(Examination); Green—(Problem Assignments) (Fall—day and evening; summer 1976)

334 **Advanced Criminal Procedure** (2) Starrs, Robinson, Ferster

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Starrs—(Examination and Problem Assignments); Robinson, Ferster—(Examination) (Fall—day and evening)

335 **Jurisprudence** (2) Mayo, Kramer

Basic jurisprudential concepts; nature of law; development of legal institutions; jurisprudential schools—natural law, analytical, historical, sociological, functional; law and logic; law and justice; the judicial process; legislative, executive, administrative decision-making; impact of politics, economics, and scientific advance on legal systems; contemporary trends in jurisprudential thought. Mayo—(Examination); Kramer—(Writing Assignments) (Fall—evening; spring—day)

336 **Taxation—Federal Income** (3) Weaver, Hambrick, Speiller

Survey of substantive provisions of federal income tax law, including concept of gross income, provisions affecting taxation of family and individual transactions, limitations on allowable deductions, sales and dispositions of property, problems of capital gains taxation, nontaxable exchanges. Weaver—(Examination and Problem Assignments); Hambrick—(Examination) (Fall—day and evening; spring—day; summer 1976)

338 **Taxation—Federal Estate and Gift** (2) Kramer, Hambrick

Survey of substantive provisions of federal estate and gift tax laws, including inter vivos transfers, transfers in contemplation of death, joint interests, life insurance proceeds, property subject to powers of appointment, marital deduction and split gifts; tax procedure. (Examination) (Fall—day and evening)

339 **Collective Bargaining and Labor Arbitration** (3) Merrifield, Rothschild

Collective labor agreement: content, negotiation, administration through grievance procedure and arbitration; problems in settlement of labor disputes. Prerequisite: Law 341 Merrifield—(Examination and Problem Assignments); Rothschild — (Problem Assignments) (Spring — day and evening)

340 **Taxation—Federal Income, Corporations and Shareholders** (3) Hambrick, Tannenwald, Tucker, Osteen

Continuation of Law 336. Primary emphasis on corporate-shareholder relationships. Problems of corporate dividends, redemptions of stock, distributions in partial and complete liquidation, stock dividends, bail-outs, and dividends in kind closely analyzed. Federal income tax problems involved in the formation of corporations, the sale of corporate businesses

(including collapsible corporations), mergers and acquisitions, and corpo rate divisions. Students who have received credit for former Law 33 cannot receive credit for Law 340. Prerequisite: Law 336. (Examina tion) (Fall—evening; spring—day)

341 Labor Law (3) Merrifield, Albert, Rothschild

Law governing labor-management relations, organizations and representa tion of employees, regulation of economic weapons, enforcement of col lective bargaining agreements, interunion and intra-union relations. (Ex amination) (Fall—day and evening; summer 1976)

342 Moot Court (1 or 2)

Satisfactory participation in the upperclass competition results in one hour of academic credit. Finalists in the upperclass competition receive two hours of academic credit. Finalists in the first-year competition receive one hour of academic credit. No academic credit is awarded to nonfinalists in the first-year competition. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring)

343 Law Students Civil Rights Research Council (LSCRRC) (1 or 2) Kuhn

Clinical problems concerned with the legal problems of minorities, women, and the poor. Students work with organizations such as the Lawyers Committee for Civil Rights Under Law, Women's Legal Defense Fund, Civil Rights Division of the Justice Department, Institute for the Development of Indian Law, National Committee Against Discrimination in Housing, and National Senior Citizens Law Center. Approximately 60 hours of work per semester is required for each credit hour. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall, spring, summer—as arranged)

344 Legal Writing (1 or 2) Staff

Preparation of a research paper under the supervision of a full-time mem ber of the Faculty who will determine, prior to registration, whether the work required for the topic selected justifies one or two semester hours of credit. If elected for one hour of credit, this course may be repeated to meet the legal writing requirement for the degree. Approval of the fac ulty member is required prior to registration. (Research Paper) (Fall and spring—as arranged; summer 1976)

345 Students-in-Court (4) Staff

Open only to third-year law students. In the D.C. Law Students in Court Program, students represent indigent litigents in the Small Claims, Land lord-Tenant, and Criminal (misdemeanors) division of the D.C. Superior Court. Their duties include client interviews, investigation, settlement ne gotiations, preparation and argument of motions, and conduct of trials. Students are required to spend one day in court and attend seminars each week (Wednesday or Thursday evening at the student's option in the civil program; Monday evening and Saturday morning in the criminal pro gram). Some seminars will be held off campus. Application must be made during the spring semester of the preceding academic year; prefer ence will be given to students with a cumulative-grade average above 75; however, consideration is given to past participation in clinical or extra curricular activities or employment which provides background for litiga tion and working with indigents. Students may participate during the sum mer, during the full academic year, or during the summer plus one other

semester. This course may not be taken at the same time as Law 579, or any litigating activities in Law 346. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged; summer 1976)

346 **Legal Aid** (arr.) Staff

Work done in connection with the Legal Aid Bureau under the supervision of the faculty adviser, who will determine, prior to registration, the number of semester hours of credit the work required will justify and whether the student has all prerequisites. Any litigating activities of this course may not be taken at the same time as Law 345, or 579. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged)

347 **Insurance** (2) Schiller, Pock

A primary risk distributing medium and the rules by which legislative, administrative, judicial bodies seek to promote its benefits and avert its dangers. Includes insurance marketing, insurable interest, subrogation, transfer of insurance benefits to nonpolicyholders, coverage and other insurance policy provisions, disposition of claims. (Examination) (Fall—day and evening; summer 1976)

348 **Domestic Relations** (2) Potts, Ferster

Marriage, annulment, and divorce; adoption and custody of children; economic relations. (Examination, Research Paper, and extensive interdisciplinary readings). (Fall—evening; spring—day; summer 1976)

349 **Local Government Law** (2) Pinsky

Decision-making processes in metropolitan and local communities; types and objectives of city, county, special-function local government units; intergovernmental relations; original organization and changes; personnel; local lawmaking; responsibility in tort; introduction to community planning. (Examination) (Spring—evening)

351 **Law and Accounting** (2) Cibinic, Ginsburg, Herman

Study of fundamental accounting principles with emphasis on corporation accounting; legal and accounting implications of specific items in financial statements of corporations; inventory adjustments; corporate transactions, distributions, capital adjustments. Strongly recommended for students who have had no accounting. (Examination and Problem Assignments) (Fall—evening; spring—day)

355 **Government Contracts** (3) Nash, Cibinic

Survey of basic law underlying government procurement, basic power and limitations on federal government in entering into contracts, administrative and legislative policies governing these contracts, advertised and negotiated procurement procedures, forms of contracts and clauses used. Law 431 *Government Procurement Law* is the substantial equivalent of this course. (Examination and Problem Assignments) (Spring—day)

359 **Patent Law** (3) Kayton

Law of patents subsequent to issuance of patent; nature of patent as property and as a legal instrument; validity—novelty, nonobviousness, commercial success; infringement—direct and contributory, doctrine of equivalents and file-wrapper estoppel. Substantive concepts introduced in an

order approximating patentee's and infringer's cases in litigation. Designed for students intending to specialize in patent law; knowledge or experience in patent law helpful but not prerequisite. (Examination) (Fall—evening)

362 **Patent Office Practice** (2) Kayton

Substantive and procedural law of patents leading to issuance of patents, mainly related to proceedings before U.S. Patent Office. Obtaining and preserving earliest possible patent filing date; continuing applications, res judicata, novelty and nonobviousness requirements; substantive rules of priority of invention and related affidavit practice; nature of claims and formal defects; restriction and double patenting. Designed for students intending to specialize in patent law. Prerequisite: Law 359. (Examination) (Spring—evening)

372 **Administrative Law** (3) Miller, Park, Banzhaf, Barron

Study of the administrative process in executive and independent regulatory agencies; emphasis on judicial review. Formal and informal decision-making, investigation, planning, and public administration functions of the agencies as related to their legal limits and to the roles of lawyers in government and private practice. Relationships of agencies to the executive and legislative branches, to public and private interest groups, and to the social, political, and economic aspects of various philosophies of government regulation. Miller—(Research Paper); Park—(Examination and Writing Assignments); Banzhaf—(Examination) (Fall—day, spring—evening)

375 **Remedies** (3) Cibinic, Ginsburg, Nash, D. Green, Smaltz

Development and use of judicial remedies that give relief for past or threatened injuries to interests of personalty and property. Remedial approaches include compensatory and punitive damages, injunctions, unjust enrichment, constructive trusts, equitable liens, tracing, subrogation, and specific reparation. Emphasis on comparing remedial options in fraud, mistake, duress, breach of contract, and abuse of fiduciary relationships. The grade *CR* (credit) or *NC* (no credit) only is given in sections taught by D. Green. Cibinic, Ginsburg—(Examination); Green—(Problem Assignments) (Spring—day and evening)



377 **Legislation** (2) **Ferster**

Legislative process and roles of participants in the process; operation of United States Congress and state legislatures, including fact finding, organization, procedure. Statutory interpretation emphasized to provide foundation for more advanced courses. (Examination) (Spring—day)

380 **Environmental Law** (3) **Reitze**

Government control of environmental pollution; the National Environmental Policy Act; solid waste management; noise, water, and air pollution control; and common law remedies. (Examination)

381 **Environmental Planning** (3) **Reitze**

Survey of the law of environmental planning, including selected topics of land use planning, mining, forestry, energy, transportation, public land law, and ocean protection. (Examination) (Fall—day and evening)

385 **Trial Practice Court** (2) Jackson, Ryan, Kendrick, Skinker, Stevas, Altshuler, Nunzio, McArdle, Seidel

Trial of assigned cases, trial tactics and techniques, pre-trial and courtroom procedures pursuant to federal rules. Students may repeat this course once for credit. Prerequisite: forty-two semester hours, including Law 218. Prerequisite or concurrent registration: Law 232. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and Spring—day and evening)

389 **Medicine for Lawyers** (2) **Hirsh**

Survey of the basic medical sciences and the rudiments of clinical medicine as encountered in the practice of law. Medical terminology, the disease process, trauma, and industrial medicine. The application of this fundamental information is demonstrated in personal injury or negligence and malpractice litigation as well as in commitment and equitable proceedings. Students may witness autopsies at the D.C. Medical Examiner's Office, surgery at George Washington University Hospital, and medical rounds at D.C. General Hospital. Emphasis on enabling the lawyer to communicate most effectively with medical specialists. (Examination) (Fall—day)

390 **Forensic Medicine** (2) Sharpe, Fiscina, Head

Malpractice, insurance, and alternatives to professional liability litigation; securing and presenting medical evidence to prove causation and damages; chemical test data and behavioral science findings in court; entry into and practice of the professions; professional organizations; hospitals; professional service delivery; public policy intervention in medical science—for example, abortion, transplantation, and coerced treatment. (Examination) (Fall—day and evening)

394 **Women and the Law** (2) Dorian, Aron

An examination of the treatment of women in all areas of the law and of legal remedies for sex discrimination. Emphasis on constitutional law, criminal law, discrimination in the media, education, and employment. Students choose clinical projects or research papers on which to focus the semester's work. Enrollment limited to 30 students. (Research Paper) (Fall and spring—evening)

395 **Public Strategies in Tax Policy and Tax Reform** (2) **Brandon**

Study of the formulation of tax legislation and administrative tax policy.

Emphasis on the development of legal strategies to reform the present structure and its administration. Classic reform arguments, new proaches, and present legislative activity studied from the point of v of citizen action, lobbying, and other strategies to influence pending cisions. Open to a limited number of third-year students. Final g based on class participation and a written project formulating re strategy to deal with specific problems selected by the student. (Wri Assignment)

396 Legal Activism (3) Ban

Study of the use of law and the legal process, not as a technique for solving disputes between identified individuals and/or organizations, as a powerful tool for ameliorating problems of general public inter Principles and techniques of legal activism, maximum effectiveness of pu lic interest actions, how these actions differ from conventional legal pra tice. To learn these techniques effectively, and to test and develop th proficiency in their use, students will form clinical project groups a initiate or participate in a legal or law-related activity directed against public interest problem of their own choosing. (Fall—day)

398 National Center for Law and the Deaf Clinical Education Activities (1, 2, or 3) Ban

Work with the National Center for Law and the Deaf/Hearing I paired in bringing legal information, services, and representation to more than 13 million Americans who are deaf or hearing impai The Center, a joint program of the National Law Center and the G laudet College, is designed to help make the hearing impaired aware their legal rights and to assist them in solving their legal and law lated problems. Students may participate in one or more projects: counseling persons with hearing impairments about legal problems a walk-in clinic usually held on the Gallaudet College campus; (2) p paring and participating in workshops for hearing-impaired persons acquaint them with their rights and obligations under the law; (3) sisting in representing the interests of deaf and hearing-impaired pers in judicial and administrative proceedings; (4) preparing research pap on topics related to law and the deaf, or preparinig handbooks expla ing legal topics to the hearing-impaired. Students may learn some s language, but will be assisted by trained translators when dealing w deaf individuals. Approximately 60 hours of work per semester required for each credit hour. Students may repeat this course for maximum of eight semester hours of credit. This course may not taken at the same time as Law 345, or any litigating activities in Law 3 The grade of *CR* (Credit) or *NC* (No Credit) is given for this cou (Fall, spring, summer—as arranged)

399 Clinical Law Work (arr.) Sp

Projects involving litigation, research, or public interest activities of legal nature (including aid to indigents, support of public interest p profit corporations, and support of governmental agencies or courts) be initiated and will be supervised by a faculty member. Projects must approved in advance by the Law Center Supervisory Committee (tw members) both as to whether the project is appropriate and as to number of semester hours of credit to be granted. A maximum of semester hours of credit may be taken in one or two semesters. Th course is open to a limited number of third-year law students. The gra *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall spring)

ADMINISTRATIVE LAW: ECONOMIC REGULATION

Faculty Advisers: A.S. Miller, R.E. Park, G.E. Weston

402 **Executive Function** (2) Miller

Executive branch in constitutional theory; major trends in development of executive-administrative function; organization of executive branch; relationship of executive to Congress and judiciary; policy-making procedures within executive branch including role of Bureau of the Budget in national policy planning; case studies in exercise of executive power in such functional areas as national defense, race relations, national economy, foreign economic relations; role of law and lawyers in executive decisional and implemental process. (Research Paper) (Spring—day)

404 **Securities Regulation** (2) H. Green, M. Cohen, Mathews, Michaely

State and federal laws governing offering and distribution of securities to the public by corporate issuers and others, regulation of securities markets, rights and liabilities of purchasers under such statutes. Emphasis on statutes administered by Securities and Exchange Commission. (Take-home Examination) (Fall—evening; spring—day)

405 **Regulation of Securities Markets** (2) Pitt, Sonde

Operation of over-the-counter and exchange markets, including competitive and monopolistic practices in each market; relationship of antitrust laws and securities regulations to concept of a free and open market place; role of regional exchanges and third market in providing competitive element in market; advantages and disadvantages of a fragmented market; minimum fee structure, rebates and their effect on merchandising of securities and financial soundness of industry; use and availability of economic data in evaluating performance of market place. The seminar will examine matters directly of interest to graduate law students, lawyers, economists, and political scientists. (Take-home Examination) (Spring—evening)

412 **Food and Drug Law** (2) Kaplan, Becker

The Federal Food, Drug, and Cosmetic Act, and related laws. Consumer, government, and industry viewpoints. (Choice of Paper or Examination) (Spring—evening)

413 **Public Policy and Mass Media** (2) Barron, Cohn

Institutional structure of mass media and their interrelationships; psychological aspects of mass communications; continuing adjustments among public interest goals, the economic system, and technological developments; influence of and controls exercised by government, other institutions, and private groups; conflict between freedom of speech of the media and other major community interests; the media's relationships to the interests of dissident and minority groups and the access of these groups to the media. Barron—(Examination or Research Paper); Cohn—(Research Paper) (Spring—evening)

414 **Regulated Industries** (2) Park

Substantive problems of business regulation in terms of natural monopolies, licensed industries, subsidized industries, and safety regulation. Typical problems raised include the role of intervenors, the impact of regulation upon management and market behavior, the uses and abuses of

economic evidence, the role of agencies' staffs, interagency planning and regulation, and the effects of judicial and legislative review. Each student selects one industry and develops his insight into economic regulation in terms of that industry's firms, market structure, growth and development, trade associations, and regulatory agencies. (Research Paper) (Spring—evening)

417 **Seminar: Trade Regulation** (2) Weston

Group study of current problems relating to unfair trade practices and federal antitrust laws. (Research Paper) (Spring—evening)

Master of Laws candidates in the area of Administrative Law: Economic Regulation who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
372 *Administrative Law*

Other Related Courses

451 *Federal Poverty Legislation*
494 *Use and Control of Nuclear Energy*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
571 *Land Development Planning*

CORPORATION LAW

Faculty Advisers: H.P. Green, R.B. Stevenson, Jr.

422 **The Modern Corporation** (2) Miller

Analysis of the nature and role of the large business corporation in the American political economy; models of the corporation; the transnational or multinational enterprise; the concept of accountability as applied to corporate activities; reasons for the growth of large corporate enterprise; relationships of the "supercorporations" to other centers of decentralized power and to the government; the corporation as the basic planning unit of the American economy; application of the Constitution to the corporation. (Research Paper)

424 **Business Planning** (2) H. Green, Stevenson, Flyer, Lewis, Berkeley

Integrated study of corporate, financial, tax, accounting, and SEC aspects of the following: organization of a small corporation; organization of a public corporation; stock dividends, recapitalization, and stock repurchases in the context of conflict between active stockholders of a close corporation and the family of a deceased active stockholder, corporate liquidations; corporate mergers and acquisitions; and divisions of corporations. Prerequisite: Law 312, 336, and 340. Enrollment may be limited by the professor. (Problem Assignments) (Fall and spring—day and evening)



426 **Introduction to International Economic Law** (2) Stevenson

Principles and processes of international law relevant to transnational economic transactions between private parties, including protection of aliens, (individual and corporate) within national legal systems; protection by states of the economic interests of their nationals; act of state doctrine, expropriation, and the protection of alien-owned property; development of international law affecting transnational economic transactions through the decisions of national tribunals and through treaties and international agreements, adjudicatory jurisdiction of municipal tribunals and the enforcement of foreign judgments in the international context; international commercial arbitration; special problems of national and international regulation of transnational business transactions. Law 426 is recommended as a foundation for Law 427. (Examination) (Spring—day)

427 **Legal Aspects of International Business Transactions** (2) Nurick, Stevenson

U.S. law and practice, including current tax problems and U.S. restrictions on investment; brief comparison with British and civil law systems; international law, international contracts, choice of law; currency considerations; effect of SEC laws and regulations; international trade, including GATT and reciprocal trade arrangements; sources of finance, both United States and foreign, private and public, including international organizations; protection of property, settlement of disputes, and selected case studies. In addition to the regular lecturers, there will be guest lecturers in various specialties. Emphasis on current problems in international trade and investment. (Choice of Research Paper or Examination) (Spring —day and evening)

aster of Laws candidates in the area of Corporation Law who have not taken e following courses or their equivalent as part of a Juris Doctor or Bachelor f Laws program should include them in their Master's program.

312 *Corporations*
313 *Sales and Sales Financing*
329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
340 *Taxation—Federal Income, Corporations and Shareholders*

Other Related Courses

331 *Product Liability*
417 *Seminar: Trade Regulation*
431 *Government Procurement Law*
525 *Copyright Law*
526 *U.S. Trademark Law: Selection, Use, Registration, Protection, and Franchising of Trademarks*
540 *Choice of Law and Forum in Transnational Contracts, Techniques of Conflict Avoidance*
541 *Seminar: European Common Market*
555 *Taxation—Special Corporation Problems*
562 *Income Taxation of Foreign Business and Investment*

GOVERNMENT PROCUREMENT LAW

Faculty Advisers: J. Cibinic, Jr., G.J. Ginsburg, R.C. Nash, Jr.

431 Government Procurement Law (3) Nash, Cibinic

Survey of the law pertaining to government procurement, including an analysis of the unique features of government contracting and a discussion of the functions of Congress, the executive branch, and the courts in the procurement process. Law 355 *Government Contracts* is the substantial equivalent of this course. (Examination) (Fall—evening)

433 Performance of Government Contracts (3) Nash, Cibinic

Discussion of the substantive legal problems that most frequently arise during the performance of government contracts. Interpretation of specifications and the most generally used contract clauses, and analysis of the rights of the parties when performance in accordance with the terms of the contract is not obtained. (Examination and Problem Assignments) (Fall—evening)

434 Government Contract Claims and Litigation (2) Nash, Ginsburg

Analysis of the methods which can be used by the parties to a government contract to obtain legal relief, including detailed coverage of the disputes procedure, actions for breach of contract, and forms of equitable and extraordinary relief. (Examination and Problem Assignments) (Spring—evening)

435 Seminar: Government Contracts (2) Nash, Cibinic, Ginsburg

Research and discussion of selected problem areas. (Research Paper) (Spring—day)

Other Related Courses

402 *Executive Function*
424 *Business Planning*
427 *Legal Aspects of International Business Transactions*
442 *Labor Standards*
494 *Use and Control of Nuclear Energy*
495 *Legal Protection against Technological Hazards*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
535 *Negotiation: Concepts and Techniques*

LABOR LAW

Faculty Advisers: J.M. Albert, L.S. Merrifield, D.P. Rothschild

441 Seminar: Disability Problems (2) — **Doherty**

Workman's compensation law, extension of no-fault principle into motor vehicle area, and national health problems. (Examination) (Fall—evening)

442 Labor Standards (2) — **Ginsburg**

Analysis of the Fair Labor Standards Act, its scope and exemptions, the Civil Rights Act and other labor statutes; the laws establishing labor standards for government contracts, including the Davis-Bacon Act, Walsh-Healey Act, Service Contract Act, and Work Hours Act; the role of the Department of Labor, the Comptroller General, and the contracting agencies in interpretation, administration, and enforcement of these statutes. (Examination) (Spring—evening)

443 Labor Relations in the Federal Service (2) — **Tobias**

Survey of labor relations in the federal service as governed by Executive Order 11491. Emphasis on the role of the Civil Service Commission, the Department of Labor, the Congress, and the President in the development of collective bargaining relationships between unions and the federal government. (Research Paper) (Fall—evening)

444 The Individual and His Union (2) — **Gold**

Study of the legal relations between unions and their members with special emphasis on the right to fair representation, the right to union membership, compulsory union membership, the imposition of discipline upon union members, reporting requirements, the conduct of internal union elections, the fiduciary duties of union officers, the imposition of trusteeships, the regulation of racketeering, and political action of unions. Prerequisite: Law 341. (Examination) (Summer 1976)

445 Labor Relations in State and Local Governments (2) — **Jascourt**

Analysis of the shifting and emerging legal concepts that affect the form, scope, and consequences of labor relations in schools and colleges and in municipal, county, and state governmental bodies. Survey of the varied statutory and de facto labor relations systems and their impact on the development of bilateral decision-making. Examination of (1) problems caused by the concurrent existence of civil service laws and the diffusion of governmental authority, (2) impasse resolution, and (3) strikes and other concerted activities. (Problem Assignments)

446 Equal Employment Opportunity (2) — **Ginsburg, Hartman**

This course covers the spectrum of federal laws and executive orders relating to all types of discrimination in employment, including Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972; the Equal Pay Act of 1963, as amended in 1972; the Age Discrimination in Employment Act; the Civil Rights Act of 1866; the Fourteenth Amendment; the National Labor Relations Act; Executive Orders 11246 and 11375 relating to government contractors (including the "Philadelphia Plan" and other government-imposed "affirmative action" plans and bid conditions, and Revised Order No. 4 relating to sex discrimination). The course includes the substantive and procedural rights available to employees of firms doing business with the government, as

well as those of other private firms and state and local government agencies subject to the above federal legislation. (Examination) (Fall—evening)

447 **Seminar: Labor Law** (2) Merrifield, Chanin

Group study of contemporary problems of public sector labor law. (Research Paper) (Spring—day and evening)

449–50 **Seminar: Labor Litigation** (1–1) Gold

Intensive study of recent Supreme Court and appellate court decisions in the area of labor law; special emphasis on the contrasting variables which influence the respective decision-making processes of the National Labor Relations Board and the courts. Particular attention to labor law cases pending before the Supreme Court for decision during the current term. Analyses of the briefs filed in pending cases; attendance at oral argument, post mortems of the arguments and decisions, with classroom participation by attorneys involved in some cases. Grades and credit for both halves of the course assigned only on completion of the second half. Enrollment may be limited. Admission by permission of instructor. Prerequisite: Law 341. (Research Paper) (Academic year: every other week—evening)

Master of Laws candidates in the area of Labor Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

339 *Collective Bargaining and Labor Arbitration*
341 *Labor Law*

Other Related Courses

459 *Problems of the Consumer*
460 *Current Problems in Civil Rights*

LAW AND POVERTY

Faculty Advisers: R.S. Kuhn, D.P. Rothschild, J.E. Starrs

451 **Federal Poverty Legislation** (2) Mirel

Students are given a chance to observe at first hand the problems inherent in implementing a federal policy to alleviate poverty through legislation. Students are assigned to work with individual poverty agencies in the District of Columbia on matters relating to the federal funding agencies. Discussions focus on various aspects of poverty law problems as lawyers deal with them—from conception of the legislative program, to Congressional debate, to administrative policies, to fund distribution, to litigation. (Research Paper) (Fall—day)

458 **Housing the Poor** (2) Starrs

An in-depth analysis of current housing problems, including three main subjects: (1) Discrimination in housing. (2) Landlord and tenant relationship, including a discussion of leases and their clauses and of the eviction process, tactical and substantive defenses to it, and affirmative avenues of redress on behalf of the tenant; public housing and building code enforcement. (3) Home ownership by the poor, including its financing by instruments such as the deed of trust and the installment land contract as well as federal subsidy programs. Admission by permission of instructor. (Research Paper)

459 **Problems of the Consumer** (2 or 3) Rothschild

Clinical treatment of consumer protection. Minimum of 8 hours work commitment each week required; 2-hour weekly class required in addition for 3 credits. Students purchase consumer protection materials and Text, and are divided into projects groups. For example, the National Law Center has negotiated with a commercial TV station to put on a series of news spots dramatizing consumer problems and will also run a "Consumer Help Center." This activity will involve three groups: (1) a group to work with the station on programming, (2) a group to run the Consumer Help Center, and (3) a research group to investigate the results of complaint intake, referral, and disposition. Other students will work in inner-city store-fronts, with county government agencies, and on the editorial staff of the *Consumer Protection Reporting Service*. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—day; summer 1976)

460 **Current Problems in Civil Rights** (2) Kuhn, Silard, Robinson

Uses of law in the effort to achieve racial equality, in areas such as (1) discrimination against minority groups and the poor in land use and zoning, (2) school desegregation, and (3) employment discrimination. The class is divided into groups, each dealing with a problem situation in one of these areas. Students represent fictitious clients, write briefs, and argue in class before a student panel of judges, which then writes an opinion. Grades are based on these written and oral presentations, plus brief critiques of other groups' presentations. Enrollment limited by the instructor. (Problem Assignments) (Fall—evening; spring—day)

Other Related Courses

441 *Seminar: Disability Problems*
472 *Administration of Criminal Justice*
475 *Law and Criminology I: Search for the Causes of Criminal Behavior*
476 *Law and Criminology II: Society's Responses to the Criminal Offender*
477 *The Police and the Community*
560 *Taxation—State and Local*
571 *Land Development Planning*
575 *Community Economic Development*
592 *Seminar: Constitutional Law*

LAW, PSYCHIATRY, AND CRIMINOLOGY

Faculty Advisers: T.F. Courtless, Jr., E. Ferster

472 **Administration of Criminal Justice** (2)

Consideration and analysis of selected advanced problems in the administration of criminal justice. The subject matter covered will vary from year to year, with concentration in areas of current interest and dynamic change (e.g., right to counsel, arrest and interrogation, search and seizure, prejudicial publicity, discovery, electronic interception, mental impairment). Emphasis will be placed on the role and professional responsibilities of prosecutor and defense counsel and on developmental trends in the law. (Research Paper or Examination)

473 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (2) Starrs

Designed to acquaint the student with the operations of a modern crime

laboratory and the courtroom acceptability of testimony of forensic scientists and other evidence on laboratory test results. Identification of individuals (fingerprints, palmprints, footprints, voiceprints, anthropological reconstruction, hair identification, and serology), identification of objects (ballistics, handwriting, typewriting, fiber identification, paints, varnishes, glass, wood, and paper), toxicology, pathology, forensic use of the microscope and the camera, the coroner and the medical examiner systems, and drug law enforcement. Visual aids, crime laboratory guest lecturers, and field trips to crime laboratories. (Research Paper) (Spring—day)

475 **Law and Criminology I: Search for the Causes of Criminal Behavior** (2) Courtless

Role which criminological knowledge of crime causation may play in assisting lawyers to appraise the effectiveness of various alternative social and legal devices in controlling deviant behavior. The search for factors related to criminal behavior will be developed historically, with emphasis on current causal theories developed by various disciplines. Model as well as operational penal codes, sentencing and probation practices, and specialized facilities will be analyzed in terms of their relationship to such causal theories. (Research Paper) (Fall—day)

476 **Law and Criminology II: Society's Responses to the Criminal Offender** (2) Courtless

Study of the development and current use of society's three major approaches to the handling of offenders: punitive, mechanical, and correctional. Emphasis on society's changing responses to criminal and delinquent behavior, and research findings concerning effectiveness of these responses. Analysis of treatment strategies to facilitate communication between members of the legal profession and behavior scientists charged with effectuating these strategies. Prerequisite: Law 475. (Research Paper) (Spring—day)

477 **The Police and the Community** (2) Courtless

Problems and potential of contemporary urban law enforcement: the role and perspective of the police officer; the police *qua* organization; "styles" of law enforcement; law enforcement in the inner city; relationship with ethnic minorities; civil disorder; police-community relations; methods in arrest and investigation; complaint review procedures; science and technology in law enforcement; police handling of juveniles; crime and crime statistics. (Problem Assignments)

478 **Post-conviction Dispositions** (2) Axilbund

Study of the practice, problems, and alternatives facing a defendant, and discussion of the goals and standards for the criminal justice system. Enrollment limited to 25 students. Students who receive credit for Law 478 cannot receive credit for Law 480. (Examination) (Spring—day)

479 **Seminar: Criminal Practice** (2) Foster, Weisberg

Tactical and practical applications of criminal law; mastery of techniques in trying criminal cases. Class sessions built around mock problems based on actual criminal cases; student role-playing as defense attorneys and prosecutors. All phases of criminal trial work covered—client relations, investigation, discovery, trial preparation; particular emphasis on courtroom techniques—direct and cross examination, impeachment, refreshing recollection, laying foundations for exhibits, argument, and courtroom demeanor. Though many of the mock problems are written from a defense viewpoint, techniques taught are relevant to both prosecu-

tion and defense. Enrollment limited to 15 third-year and graduate students. Prerequisite: Law 334. Students may elect to receive either a numerical grade or the grade *CR* (credit) or *NC* (no credit). (Fall and spring—evening)

480 **Law of Criminal Corrections** (2) Cripe

Study of two principal areas: (1) sentencing procedures, including probation, parole, and imprisonment; (2) legal rights of prisoners. Enrollment limited to 25 students. Students who receive credit for Law 480 cannot receive credit for Law 478. (Examination) (Fall—evening)

485 **Seminar: Health Care Delivery Systems** (2) Sharpe

Study of the role of the lawyer in existing and proposed national systems for delivering health care. Students will gain familiarity with the concepts and terms in health care delivery by working with issues in the design, finance, and administration of existing arrangements; examination of the means of reconciling the expectations of various groups of health care service consumers and providers. (Research Paper)

486 **Seminar: Law and Psychiatry** (2) Ferster, Kirby

Designed to expose the lawyer to basic constructs of psychiatry and psychology and to explore their implications in legal rules and practice. Psychiatrists and psychologists actively involved in teaching process. Topics include psychological testing and other assessment techniques, psychiatric evaluations and reports, child custody and other family law issues, privilege and confidentiality, competency in civil and criminal contexts, criminal law matters (including criminal responsibility and dispositional issues), civil commitment, right to treatment, right to refuse treatment, experimental procedures, and informed consent. Problems of counseling, legal ethics, preparation for trial, direct and cross examination, and other aspects of practice considered. There is ordinarily at least one session in a mental institution. (Take-home Examination or Research Paper) (Fall—day; summer 1976)

Other Related Courses

390 *Forensic Medicine*
591 *Legislative Drafting*
592 *Seminar: Constitutional Law*

LAW, SCIENCE, AND TECHNOLOGY

Faculty Adviser: H.P. Green

492 **Seminar: Science and the Legal Process** (2) H. Green

Reciprocal relationships between law and science; absorption of scientific concepts into substantive law through adjudication, legislation, and rule-making; techniques and procedures used in handling, developing, and deciding scientific issues. (Research Paper) (Fall—evening)

494 **Use and Control of Nuclear Energy** (2) H. Green, Malsch

Development of law and legal institutions to deal with revolutionary scientific developments in nuclear energy. Laws and regulations concerning peaceful uses of nuclear energy, including licensing, safety, environmental, security, and antitrust considerations. (Research Paper)

495 **Legal Protection against Technological Hazards** (2) Dembling, Brow

The growth and development of law and legal institutions to protect so ciety against the hazards inherent in new technologies with particular em phasis on the progress of reconciling the protection of the public with the desire for rapid progress. (Research Paper)

Other Related Courses

380 *Environmental Law*
381 *Environmental Planning*
402 *Executive Function*
412 *Food and Drug Law*
413 *Public Policy and Mass Media*
431 *Government Procurement Law*
505 *Intergovernmental Relations I*
531 *International Law of Air and Space*
532 *International Law of the Sea*

LAND USE MANAGEMENT AND CONTROL

Faculty Advisers: J.M. Brown, L.A. Schiller

501 **Land Development Law** (3) Brown

Study of the basic public and private means used by society to manage and control land use, such as zoning, subdivision regulation, pending condemnation, eminent domain, and privately contracted conditions, covenants, and restrictions. Identification and analysis of emerging new land control processes and the roles played by public and private entities involved in or affected by land use management and control efforts at the various echelons of government. Students participate in a game-simulation process representing a specific complex situation in land use conflicts involving their inherent technological, social, economic, political, and legal elements. In the model situation students will assume roles as attorneys and work with assigned "clients." (Client-oriented written work and class participation) Enrollment limited by the instructor. (Fall-day)

502 **Water Resources Law** (2) Hedeman

Introductory survey course in the law relating to water resources. History and development of water rights systems in the United States using a comparative analysis of Eastern and Western water law doctrines, the trends toward their modification, and study of the increasing influence of federal laws and projects. Identification of federal-state-local relationships, conflicts, and institutions; consideration of river-basin management and inter-basin transfers; description of proposed creation of new sources. (Examination) (Fall—evening; summer 1976)

504 **Seminar: Current Problems in Land Use Controls** (2) Brown, Schiller

New and emerging concepts of regionalism considered in the light of actual problem situations and attempts being made by various echelons of government to provide effective and equitable land use management and control. Examination of actual problem areas of major concern, including

constitutional, administrative, political, judicial, social, economic, and technological elements. Functional planning and decision-making with respect to selected problem areas and their strategical and tactical transactions examined within the compass of the broader policy considerations involved. Guest lecturers; clinical exposure to various government agencies responsible for cooperating with the selected problems. (Research Paper) (Spring—evening)

505 **Intergovernmental Relations I** (2) **Nash**

Study of federalism, emphasizing current techniques for achieving cooperation and coordination between federal, state, and local governments. Detailed consideration of devices used, including interstate compacts, grants-in-aid, and exercise of regulatory powers. (Research Paper)

506 **Intergovernmental Relations II** (2) **Nash**

Advanced seminar on multi-government activities and current topics on intergovernmental relations. (Research Paper)

Master of Laws candidates in the area of Land Use Management and Control who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

327 *Modern Real Estate Transactions*
349 *Local Government Law*
372 *Administrative Law*
380 *Environmental Law*
381 *Environmental Planning*

Other Related Courses

451 *Federal Poverty Legislation*
458 *Housing the Poor*
460 *Current Problems in Civil Rights*
492 *Seminar: Science and the Legal Process*
494 *Use and Control of Nuclear Energy*
495 *Legal Protection against Technological Hazards*
558 *Taxation—Real Estate and Income*
560 *Taxation—State and Local*
591 *Legislative Drafting*
593 *Seminar: American Legal History*

ENVIRONMENTAL LAW

Faculty Adviser: A.W. Reitze, Jr.

508 **Environmental Litigation** (2) **Miller, Steenland**

Special problems of environmental lawsuits. Topics include pleadings, procedural problems, selection of the proper court, problems of proof, remedies, selection of parties, discovery techniques and trial preparation, and the use of expert witnesses and scientific evidence. Prerequisite: Law 380 or graduate status. Enrollment limited to 25 students. (Choice of Research Paper or Clinical Work) (Spring—evening)

509 **Clinical Studies in Environmental Law** (2 or 3 or 4) Re

The student works on a project in the environmental law field under supervision of both the faculty director of the program and a law practicing environmental law. The project may involve working with government agency, a congressional committee, a private practitioner, a nonprofit public-interest environmental organization. Admission to course requires second-semester second-year, third-year, or graduate stan ing and permission of the Director of the Environmental Law Program Students who have mastered the fundamentals of environmental law a selected for this course. Normally this will require completion of at lea Law 380. In addition, consideration will be based on the other environ mentally related courses taken including those in Natural Resources La and in Law, Science, and Technology, as well as work experience and othe demonstrated interest in environmental law. Students may repeat the course for a maximum of 8 semester hours of credit. The grade CR (Credit) or *NC* (No Credit) is given for this course. (Fall—day)

Master of Laws candidates in the area of Environmental Law who have no taken the following courses or their equivalent as part of a Juris Doctor o Bachelor of Laws program should include them in their Master's program.

380 *Environmental Law*
381 *Environmental Planning*

Master of Laws candidates specializing in Environmental Law or Land Use Management and Control may use the following courses to complete the degree requirements.

598 *Research in Public Law*
599–600 *Thesis*

Other Related Courses

413 *Public Policy and Mass Media*
431 *Government Procurement Law*
492 *Seminar: Science and the Legal Process*
494 *Use and Control of Nuclear Energy*
495 *Legal Protection against Technological Hazards*
501 *Land Development Law*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
532 *International Law of the Sea*
560 *Taxation—State and Local*
571 *Land Development Planning*
591 *Legislative Drafting*

PATENT AND TRADE REGULATION LAW

Faculty Advisers: L.J. Harris, I. Kayton, G.E. Weston

522 **Patent and Know-how Licensing** (2) Brunswick

The business and legal criteria necessary to implement and maintain suc cessful licensing programs; emphasis on the strategy and techniques th

permit a proprietor of intellectual property to effectively exploit his status as the owner of a unique form of property. Subject areas covered are business objectives in licensing; legal outline of licensing situations; rights and duties of license parties; factors in selecting which inventions to license—financial, legal, and commercial; finding and selecting the right licensees; determining and negotiating the terms and clauses of the contract; administering and enforcing the license; antitrust and misuse constraints on the business and law of licensing; tax factors affecting the patent and know-how contract; special problems in trade secret, know-how, and show-how contracts; international licensing. Prerequisite: Law 359 and 362, or former Law 360. (Choice of Paper or Examination) (Spring, odd years—evening)

523 **Court Review of Patent Office Decisions** (2) Dunner

Procedure and procedural law involved in appealing to the U.S. Court of Customs and Patent Appeals and the U.S. District Courts from administrative decisions in the U.S. Patent Office. Designed to provide an exhaustive step-by-step procedural progression through *ex parte* and *inter partes* patent and trademark appeals. Emphasis on the forms used in the many motions and proceedings before the U.S. Court of Customs and Patent Appeals and the District Courts required to perfect an appeal. Attendance at and critique of actual court proceedings. Introductory material includes administrative appeals before the U.S. Patent Office Board of Appeals. Prerequisite: Law 359 and 362, or former Law 360; or the equivalent in experience. (Examination) (Fall, even years—evening)

524 **Chemical Patent Practice** (2) White

Seminar covering patent application preparation, prosecution, appeals, and licensing which are peculiar to chemical patent practice. Prerequisite: Law 359 and 362, or former Law 360; or comparable experience in the practice of patent law. (Examination) (Fall, even years—evening)

525 **Copyright Law** (2) Moore

Historical background; formalities and essentials in securing a copyright; subject matter of copyright; remedies; international aspects of copyright under Berne Union, Universal Copyright Convention, Inter-American Convention; copyright licensing and performing rights societies. (Examination) (Spring—evening)

526 **U.S. Trademark Law: Selection, Use, Registration, Protection, and Franchising of Trademarks** (2) Leeds

Procedural and substantive law on use, registration, and protection of trademarks, including detailed registration procedure in the U.S. Patent and Trademark Office, common law rights to marks, and licensing and franchising arrangements. Prerequisite: Law 329. (Examination) (Fall, odd years)

527 **Advanced Topics in Patent Law** (2) Harris

Multidisciplinary consideration in depth of current industrial-intellectual property problems; licensing and protection of industrial property; uses and abuses of patents; governmental regulation; protection and transactions abroad; international treaties and arrangements; role of patents, trademarks, and trade secrets in business; economic and social functions of patents, trademarks, and copyrights. Students are exposed to pertinent source materials, professional research methods and techniques. Oppor-

tunity for oral presentation and discussion of term papers prior to s
mission is provided to encourage instructional dialogue among stud
and the investigation and analysis of issues. Prerequisite: Law 359 a
362, or former Law 360; or the equivalent in experience. (Resea
Paper) (Spring—evening)

528 **Patent Interference Practice** (2) Klitzm

Procedure and practice in inter partes determination of priority of inv
tion in the U.S. Patent Office. Topics: conception, reduction to pract
diligence, corroboration, preliminary statements, motions, and tes
mony practice and final hearing. Also covered are current problem are
such as inventor determination, discovery, and privilege. Students
quired to draft procedural document selected from categories of proble
nary statements and various interference motions. Prerequisite: L
359 and 362, or former Law 360. (Examination) (Spring, even years

529 **Research in Patent, Trademark, and Copyright Law** (2) Har

Prerequisite: Law 417, 527, and related courses; and a *B* average. Requ
in writing, with proposed outline of topic of research, must be submitt
to the Dean at least one month prior to registration day. Work must b
completed within the semester and paper submitted not later than last d
of classes. Graduate students may repeat this course once for credit w
the approval of the Dean. (Research Paper) (Fall and spring)

Master of Laws candidates in the area of Patent and Trade Regulation Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
359 *Patent Law*
362 *Patent Office Practice*

Other Related Courses

412 *Food and Drug Law*
417 *Seminar: Trade Regulation*
427 *Legal Aspects of International Business Transactions*
431 *Government Procurement Law*
492 *Seminar: Science and the Legal Process*
541 *Seminar: European Common Market*
562 *Income Taxation of Foreign Business and Investment*

INTERNATIONAL AND COMPARATIVE LAW

Faculty Adviser: International Law—W.T. Mallison

Faculty Adviser: Comparative Law—H. J. Liebesny

531 **International Law of Air and Space** (2) Dembling

Study of the development of international law relating to the use of air
space and outer space; analysis of air and space treaties in force; the role
of various intergovernmental and nongovernmental international organiza-
tions; consideration of special problems such as liability resulting from

space activities, space technology and arms control, and pollution and contamination of outer space; earth resources, sensing, etc. Enrollment limited to 25 students. (Research Paper) (Fall—evening)

532 **International Law of the Sea** (2) **Muys**

International law affecting allocation of authority over ocean space. Development of international law concerning territorial sea, contiguous zone, high seas, continental shelf, and deep seabed. Current legal and policy issues associated with these areas. (Examination) (Spring—evening)

533 **Legal Regulation of International Coercion** (2) Mallison, Jabri

Process of legal decision during war and at times when expectations of violence are high—contemporary international law of war and coercive measures short of war, such as limited naval blockade; legal aspects of modern methods of coercion—economic, political, psychological, and military; limited war and modes of preventing "escalation" to total war; regulation of hostilities including protection of war victims, civilian persons, and prisoners of war; war crimes and punishment; problems concerning weapons of mass destruction; legal control of terra; and problems of transforming coercion situations to minimum order ones. (Research Paper) (Spring—day)

535 **Negotiation: Concepts and Techniques** (2) Ramundo, Tankel

Role of the lawyer and policy maker (client) in private, intragovernmental, and international negotiations; negotiations in private practice and governmental operations; achievement of consensus among contentious parties; negotiating techniques, including effective use of the "fallback"; gaming exercises in the actual conducting of negotiations, with practical work in the preparation of claim letters, agency and national positions, and negotiating instructions. Enrollment limited by the instructors. (Writing Assignments) (Spring—evening; summer 1976)

536 **Diplomatic and Consular Law and Practice** (1) **Mitchell**

Development of diplomatic and consular relations between nations; legal rights, privileges, functions, and immunities of diplomatic and consular personnel; extent of immunity from jurisdiction of foreign government missions and representatives; problems of taxation affecting foreign government missions and personnel. (Research Paper)

537 **The International Law of Human Rights** (2) **del Russo**

Theory of fundamental freedoms from its philosophical to its legal formulation in the American and French Revolutions, the individual, vis-a-vis, the State, human rights as rights against the national government, the emerging of the individual in the law of nations as a subject of rights and duties, the individual as subject of international concern, social and political forces stressing the need for international recognition and protection of human rights, the setting of human rights standards. The Universal Declaration and its influence over the law of nations, critical assessment of the work of the UN in the human rights field, regional approach to the international protection of human rights, analysis of the case law of the European Convention, human rights in the Inter-American system, state sovereignty and the international protection of human rights, a comparative approach to human rights' protection at the national level, due process and freedom of speech in light of different legal systems. (Research Paper) (Spring—day)

540 **Choice of Law and Forum in Transnational Contracts, Techniques of Conflict Avoidance** (2) Delaume

Problems confronting the practitioner who endeavors to anticipate conflicts before they arise. Conflicts rules for transnational contracts; internationalization of contracts involving sovereign and international organizations. Techniques of conflict avoidance; express choice of law; conflict avoidance in absence of express stipulation of applicable law. Effectiveness of conflict avoidance; interrelationship of conflicts law and comparative law. (Research Paper) (Spring—evening)

541 **Seminar: European Common Market** (2) King

Analysis of treaty establishing European Economic Community: institutions of EEC and of member states and the internal law of member states as they affect doing business in EEC; series of problems arising out of establishing and operating business with and within EEC. Background in international law and antitrust law desirable. (Research Paper) (Fall—day)

546 **Soviet Law** (2) Ramundo

Concept of "socialist legality"; legal relationship of individual to state and other participants in Soviet society; role of Party in Soviet legal system; Soviet philosophy of law; state (constitutional) law; Soviet federalism; governmental apparatus, rights and obligations of citizenship; criminal law; property law; labor law; selected topics in civil law and procedure; international law. (Choice of Paper or Examination) (Fall—evening)



547 **Chinese Law** (2) Hsia

Emphasis on the legal system of Communist China; analysis of the constitutional law of the People's Republic of China, including general principles, state structure, and rights and duties of citizens; a brief survey of the administration of justice—courts, procuratorates, and lawyers; marriage law; land law; counterrevolutionary act and other criminal statutes; principles of civil law; Communist Chinese concept of international law. (Research Paper)

548 **Law of the Near East** (2) Liebesny

Law of the Arab countries, Turkey, and Iran, including basic principles of Islamic law, analysis of the present day codes, and investigation of the Western influences on laws of these countries. (Examination) (Spring—evening)

Master of Laws candidates in the area of Public International and Comparative Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

302 *Admiralty*
303 *International Law and World Order*
304 *United Nations Law and World Order*
307 *Comparative Law*
309 *Conflicts of Laws*

Other Related Courses

427 *Legal Aspects of International Business Transactions*
494 *Use and Control of Nuclear Energy*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
562 *Income Taxation of Foreign Business and Investment*

TAXATION

Faculty Advisers: J.R. Hambrick, D.B. Weaver

551 **Taxation—Partnerships and Subchapter S** (2) Weaver, Mendenhall

Income tax problems of partnerships and tax-option corporations (Subchapters K and S of the Internal Revenue Code of 1954). Prerequisite: Law 336. (Examination) (Spring—evening)

553 **Seminar: Estate Planning** (2) Weaver, Speiller, Horowitz

Study of the effective disposition of wealth by inter vivos gift and testamentary transfer; emphasis on income, estate, and gift tax considerations; use of the trust form in the transfer of wealth; use of insurance and jointly held property as part of the estate plan; planning for the continuation or disposition of the client's business interests. Preparation of an estate plan, with supporting documents is the major project for the course. Prerequisite: Law 325, 326, 336, and 338. Enrollment limited by the instructors. (Problem Assignments) (Spring—evening; summer 1976)

554 **Taxation—Deferred Compensation** (2) Chabo

Tax and labor law consequences of deferred compensation. Examina- tion of new standards imposed by Employee Retirement Security Act o 1974. Consideration of tax consequences of "unqualified" plans, lum sum distributions, individual retirement accounts, and new requiremen that defined benefit plans be insured by the Pension Benefit Guaran Corporation. Prerequisite: Law 336. (Problem Assignments and Exam nation) (Fall—evening)

555 **Taxation—Special Corporation Problems** (2) Libin, Dav

Detailed study of the principal federal tax benefits of the corporate form of doing business. Consideration of problems involved in the tax planning of the corporate structure and corporate operation, including the tax defi nition of a corporation, the special deductions available to corporat payers, the compensation of the corporate executive and employee, th debt-equity question, the accumulated earnings tax, the personal holdin company tax, multiple corporations, and consolidated returns. Survey o the types of corporations receiving special treatment under the Interna Revenue Code, such as financial institutions, real estate investment trust regulated investment companies, cooperatives, and small business corpora tions. Prerequisite: Law 340. (Research Paper) (Spring—evening

557 **Taxation—Exempt Organizations** (2) Hopkins, Myer

Tax-exempt organizations: policy and practice of preferred tax treatment for selected organizations and gifts to them. Statutes, regulations, an IRS practice; legislative origins, judicial interpretations, and policy con sideration. Tests of qualification, disqualification, and limited tax prefer ence. Mechanics of securing and retaining exemption; qualified exempt tion; unrelated business income; private inurement, political activity. De nial or loss of exemption. Return and reporting requirements. Comparat tive tax treatment of nonexempt and nonprofit organizations. Special sanctions with respect to private foundations, managers, and donors to improper, excessive, or prohibited activities. Enrollment may be limited Prerequisite: Law 336. (Examination) (Fall—evening)

558 **Taxation—Real Estate and Income** (2) Tucker

The effect of income taxes on the real estate market and real estate trans actions: sales and exchange of real estate interests; various entities for the ownership and development of real estate; the impact of taxes on the landlord and tenant; the impact of taxes on the mortgagor and mortgagee including the choice of financing techniques, such as the sale-leaseback depreciation, amortization, and obsolescence; basis and basis adjustments and casualties and other involuntary conversions. Prerequisite: Law 336 (Examination) (Spring—evening)

559 **Taxation—Oil and Gas** (2) Hambrick

Application of federal income tax law to producing segment of oil and gas industry. Classification of interests; treatment of exploration and de velopment expenditures. Depletion allowance and concept of "economic interests." Sales vs. "leasing" transactions. Organization problems. Pre requisite: Law 336. (Examination) (Spring—evening)

560 **Taxation—State and Local** (2) Fish

Taxation by state and local governments; problems of real and personal property taxation, sales and use taxes, business and personal income taxes. Limitations on taxation of interstate commerce. Congressional problems. Prerequisite: Law 336. (Choice of Research Paper or Examination) (Spring—evening; summer 1976)

562 **Income Taxation of Foreign Business and Investment** (2) Hambrick

The provisions and policies of the federal income tax law applicable to foreign income, including considerations affecting the choice of methods of engaging in foreign business and investment, treatment of controlled foreign corporations, allocation of income in foreign commerce, credit for foreign taxes, principles and trends of U.S. tax treaties. (Examination)

564 **Seminar: Special Problems of Tax Policy** (2) Field, A. Singer

Intensive study of selected aspects of the tax structure with primary attention given to the federal income tax. Problem areas are reviewed primarily from the standpoint of tax policy, including legal, economic, social, and practical considerations. Alternative solutions, including current legislative proposals, are examined. Prerequisite: Law 336, 340. (Research Paper) (Fall—evening)

567 **Seminar: Tax Practice and Procedure** (2) Irish, Muoio, Yurow

Review of the major areas of tax practice, including organization of the Internal Revenue Service, legislation, administrative regulations, tax planning, tax rulings, tax audit, settlement procedures, claims for refund, tax collection processes, criminal tax practice, and ethical problems in tax practice. Preparation of various documents is required. Prerequisite: 5 semester hours of taxation, including Law 336. (Problem Assignments) (Fall—evening)

568 **Seminar: Federal Tax Litigation** (2) S. Cohen, London

Choice of forum. Conduct of civil tax cases: trial practice in the Tax Court, the District Courts, and the Court of Claims; appeal practice in the Courts of Appeals and on certiorari to the Supreme Court; analysis and drafting of pleadings, motions, and briefs; oral argument; settlements and stipulations of fact. Comparative responsibilities and procedures of IRS and of the Department of Justice for litigation control. Prerequisite: Law 567. (Writing Assignments) (Spring—evening)

Master of Laws candidates in the area of Taxation who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

336 *Taxation—Federal Income*
338 *Taxation—Federal Estate and Gift*
340 *Taxation—Federal Income, Corporations and Shareholders*
351 *Law and Accounting*

Other Related Courses

404 *Securities Regulation*
424 *Business Planning*
427 *Legal Aspects of International Business Transactions*

URBAN LEGAL STUDIES

Faculty Advisers: R.S. Kuhn, M. Pock, D.P. Rothschild

571 **Land Development Planning (3)** McGrath*

Selected problems in urban and regional planning: applications of zoning,

* Dorn Charles McGrath, Jr., is Professor of Urban Planning and Chairman of the Department of Urban and Regional Planning in the School of Government and Business Administration.

urban renewal, and special programs available for the implementation development plans. Enrollment limited by the instructor. (Examina and Paper) (Spring—evening)

575 **Community Economic Development** (2) Steve

A substantive study of the organizational, financial, and tax-planning pects of nonprofit, cooperative, and small business organizations. Pr lems illustrating some of the legal considerations of a nonprofit org zation and a small business. Consideration of the problems of econo development and current efforts to stimulate it. Enrollment limited 25 students. Prerequisite: Law 312, 336. (Problem Assignments)

579 **Clinical Studies in Urban Law** (2, 3, or 4) Sirulnik, Sh

Open to second- and third-year students. Participants work in t National Center's Community Legal Clinic, a diverse legal service institu tion offering a variety of litigation and nonlitigation advocacy opportu ties in civil representation. Under the supervision of the Director and attorney-instructors such skills as interviewing, counseling, drafting, gotiations, civil litigation, and administrative practice are learned w serving various segments of the city's low-income populace, includ representing the elderly through a special program. Third-year studen are eligible to participate in the course as student litigators in the D trict of Columbia Superior Court. Students may also earn credit work for other public interest law institutions or government agencies. Stu dents who perform 10 hours' service each week for the semester receiv 2 semester hours of credit; those performing 15 hours' service receive semester hours; those performing 20 hours' service receive 4 semes hours. May be repeated for credit not to exceed 8 semester hours. T course may not be taken at the same time as Law 345, or any litigati activities in Law 346. The grade of *CR* (Credit) or *NC* (No Credit given for this course. (Fall, spring, summer 1976)

Descriptions for the other courses in this area (listed below) appear elsewhere in "Advanced Courses."

451 **Federal Poverty Legislation** (2)

458 **Housing the Poor** (2)

459 **Problems of the Consumer** (2 or 3)

501 **Land Development Law** (3)

505 **Intergovernmental Relations I** (2)

506 **Intergovernmental Relations II** (2)

560 **Taxation—State and Local** (2)

Master of Laws candidates in the area of Urban Legal Studies who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

349 *Local Government Law*
445 *Labor Relations in State and Local Governments*
477 *The Police and the Community*

Other Related Courses

460 *Current Problems in Civil Rights*
475 *Law and Criminology I: Search for the Causes of Criminal Behavior*

476 *Law and Criminology II: Society's Responses to the Criminal Offender*
592 *Seminar: Constitutional Law*

OTHER ADVANCED COURSES

587 **Individual Rights and Liberties** (3) Miller

Principles of equality and due process in the 5th and 14th amendments. The power of Congress to enforce the 14th amendment. Focus on individual rights and liberties under the U.S. Constitution. First amendment rights, particularly religion and speech clauses. The right of association. Other personal rights in the Bill of Rights. Methodology of judges in deciding cases involving individual rights and liberties, particularly the "balancing test" and the judges' views of societal interests. Prerequisite: Law 212. (Research Paper) (Fall—day)

588 **Legal Problems in Education** (2) Long, Smalls

Public policy issues involving individual liberties and governmental obligations examined in the context of government's participation in education. Issues covered include legal framework within which states regulate schools, rights of students and teachers, obligations to avoid discrimination and provide equal educational opportunities, and role of courts, legislators, and educational officials in resolving such issues. (Research Paper) (Spring—day)

591 **Legislative Drafting** (2) Zweben

Advanced instruction and practice in legislative drafting; overview of legislative process with emphasis on legislative drafting. Enrollment limited to 30 students. (Problem Assignments) (Spring—evening)

592 **Seminar: Constitutional Law** (2) H. Green, Silard

Group study of contemporary problems in constitutional law; process of constitutional litigation; problems of effectuating constitutional guarantees. (Research Paper) (Fall—day)

593 **Seminar: American Legal History** (2) D. Green

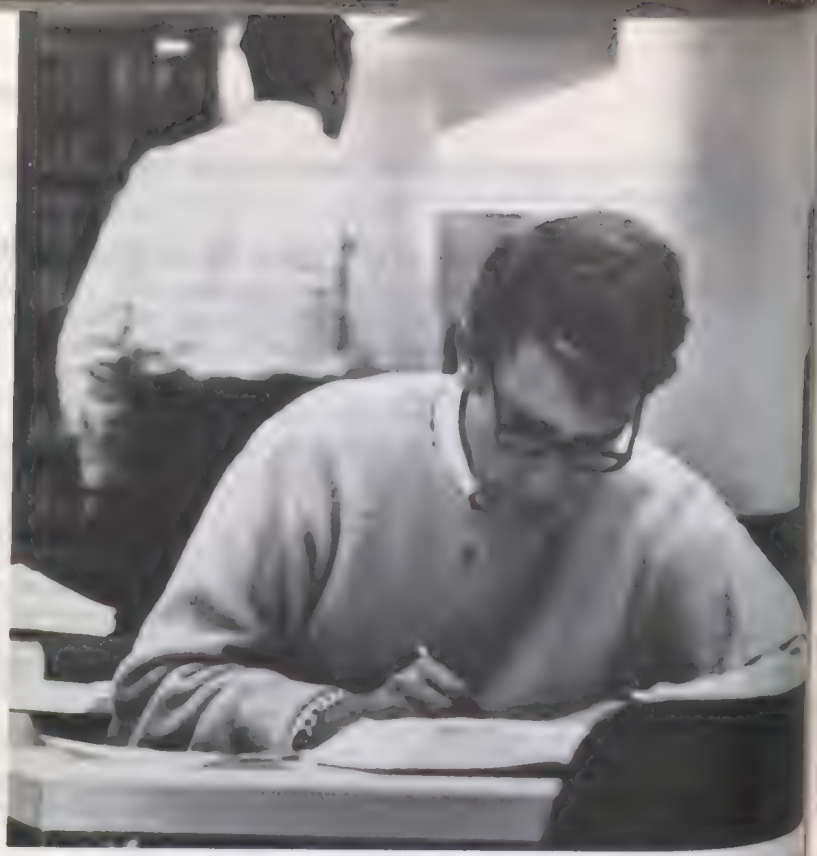
From the outbreak of the Revolution at Lexington and Concord to the death of John Marshall. An examination of men, events, and movements significant in the unfolding of our laws and legal institutions in this formative period of our national life, including a critical examination of the place of the lawyer in a revolutionary age. Comparison of the role of the lawyer during the politically and socially unsettled time of Marshall with the role of the lawyer in today's troubled scene. Each member of the seminar presents the results of his research and thought either by an oral or by a written report. The grade of *CR* (Credit) or *NC* (No Credit) is given for this course. (Problem Assignments) (Fall—as arranged)

594 **Professional Responsibility** (2) Sharpe, Bergold

Ethical problems in civil and criminal litigation. Loyalty to the client. Financing of legal services. Etiquette of acquiring and retaining clients. Procedures and problems in legal discipline. Special responsibilities of the government lawyer. Ethical conduct of judges. Issues *pro bono publico* practice. Ethical responsibilities of law professors. Plea bargaining. Role of the American Bar Association. (Examination) (Spring—day and evening)

595 **Seminar: Supreme Court Practice** (2) Gressman

Study of the jurisdiction, practice, and procedure of the Supreme Court of the United States. Certiorari and appeal; the Court's Rules of Practice;



how to prepare petitions and jurisdictional statements; the internal op-
tion of the Supreme Court; other related aspects of Supreme Court pr
tice, such as bail and stay applications, use of extraordinary writs, mo
practice, oral argument, and briefing; *in forma pauperis* procedures. St
dents will prepare documents used in Supreme Court practice—petitio
for certiorari, jurisdictional statements, and opposing briefs and argum
—using the actual conference list of cases pending before the Court. (R
search Paper) (Spring—day)

597 Independent Studies (arr.)

Limited to teaching fellows. The proposed program of study must
submitted to a faculty member in writing and approved prior to the
ginning of the semester. May not be elected for more than 12 semes
hours of credit. (Fall and spring)

598 Research in Public Law (2)

Limited to graduate students with at least a *B* average who have ha
seminar or comparable course in field of proposed research. Students
responsible for obtaining an adviser from the full-time faculty who
willing to sponsor their research. This adviser's name must be subm
to the Dean at registration. Work must be completed within the semes
Sudents may repeat this course once for credit with the approval of th
Dean. (Research Paper) (Fall, spring, summer)

599–600 Thesis (2–2)

Students must register for two successive semesters. It is recommend
that they not register for both sections in one semester. (Fall, spri
summer)

SPECIAL PROGRAMS IN RESEARCH AND INSTRUCTION

ENVIRONMENTAL LAW PROGRAM

Director A.W. Reitze

The Environmental Law Program seeks to provide both academic and clinical experience in the environmental law field. The program is predicated on an exchange of information and experience between the academic community and the world of the practicing attorney. The result is a forum for presentation, discussion, and implementation of legal avenues to cope with the critical environmental issues of the present and future generations. These goals are achieved through courses, seminars, research projects, and clinical activities.

GOVERNMENT CONTRACTS PROGRAM

Director G.J. Ginsburg

A comprehensive government contracts program provides continuing instruction for industry and government personnel in this field and a program of courses leading to the Master of Laws degree in Government Procurement Law. The program includes (1) short seminars, (2) one-week courses in advanced problems in the field, (3) an annual institute treating a problem of contemporary importance, (4) an annual conference in a major area, (5) compilation of materials for use in current courses, (6) publication of a series of monographs treating special problems in the field, and (7) special research projects.

INTERNATIONAL AND COMPARATIVE LAW PROGRAM

Director W.T. Mallison
Associate Director H. J. Liebesny

The objectives of the International and Comparative Law Program are to provide insights into the processes of international law and foreign legal systems. Specific objectives in international law are to provide a better understanding

of decision-making, sanction processes, legal institutions, and the relationsh between domestic and international law. Specific objectives in comparative include understanding of the basic institutions of civil law countries, the ception of civil law and common law in non-Western countries, and the of decisional law and judicial review in selected legal systems. Improvem which are needed to promote the rule of law in the world community are considered. International aspects of business transactions and economic dev ment are included in the Program. The objectives of the Program are imp mented through course work and seminars for both J.D. and post J.D. deg students and through research and writing in pertinent fields.

LAND USE MANAGEMENT AND CONTROL PROGRAM

Director J.M. Brown

The social, economic, technological, political, and legal interrelationships g erated by the fact that land is a basic, limited-supply natural resource, ca of being subjected to differing but concurrent public and private uses, rais growing number of issues involving management policy and control measu which are of critical concern to the future of the nation. The Land Use M agement and Control Program, through a combination of academic, clini and game-simulation processes, seeks to provide an understanding of exist and pending problems, needs, means, and opportunities for solution with resp to this developing area of national concern.

LAW, SCIENCE, AND TECHNOLOGY PROGRAM

Director H.P. Green

The Law, Science, and Technology Program deals with the reciprocal relatio ships between law and science, providing courses, seminars, research studies publications to equip the legal profession to deal more effectively with social, economic, political, and legal consequences of the nation's present m sive commitment to scientific progress.

PATENT LAW PROGRAM

Director Irving Kayton

The Patent Law Program is designed for students in the J.D. and Post-J degree programs whose intentions are to specialize in the practice of patent During the past eight years an organized program has been developed to as complete and as integrated collection of courses in patent law as possib The course offerings in patent law now total 17 semester hours, far more th any other law school in the United States. In addition, courses in tradema and copyright law are also available (see the "Patent and Trade Regulat Law" area of specialization in the "Advanced Courses" section of this catalog for a complete list and detailed description of the patent law courses offer The object of the Patent Law Program is to provide the student with a con tration in patent law at a level of specialization and maturity which will en advancement more rapidly in this field.

THE GEORGE WASHINGTON LAW ASSOCIATION

Director of Law Alumni Relations Clifford A. Dougherty, J.D.(W.H.) 1964

THE GEORGE WASHINGTON LAW ASSOCIATION was founded in 1912 and has been affiliated with the General Alumni Association since 1926. Its purposes as stated in the constitution are to promote high standards of legal education, to keep the alumni of the school in close touch with one another, especially with members of their own classes, to gather and publish at intervals information as to the whereabouts and activities of these alumni, and to further the interests of the school.

Eligible members are those who have matriculated in the school or National University and have left in good standing, and any member or former member of the faculty of the school. Active members are those eligible members who are current contributors to the Law Annual Support Program of the University and life members of the George Washington Law Association.

The Association plans publication periodically of the Law Alumni Directory. Law alumni are urged to keep the Alumni Office informed of their whereabouts so that directory information can be kept up to date.

The Law Alumni Office is in the University Library, 2130 H Street, N.W., Washington, D.C. 20052.

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Oscar A. Zabel, J.D. 1926; Seattle, Wash.
F. Elwood Davis, *ex officio*, LL.B. 1943; Washington, D.C.

THE UNIVERSITY

HISTORY AND ORGANIZATION

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "that persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the

buildings of the University were situated along H Street between Thirteenth
Fifteenth Streets.

During the last half century the University's present plant has been deve
in that section of the old First Ward familiarly known as "Foggy Bot
between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Av
The area is not without its reminders of historic interest to the University.
ident Monroe, who signed the Charter, lived at 2017 Eye Street. The first
ident of the Board of Trustees, the Reverend Obadiah B. Brown, was for
years the pastor of a church at Nineteenth and Eye Streets, and Washi
selected Twenty-third and E Streets as the site of the National Universi
had hoped to see established.

The University as it is now organized consists of Columbian College of
and Sciences (undergraduate); the Graduate School of Arts and Sciences;
professional schools, which include the National Law Center and the sch
of Medicine and Health Sciences, Engineering and Applied Science, Educa
Government and Business Administration, Public and International Affairs
College of General Studies; the Division of University Students; the Sum
Sessions; and the Division of Experimental Programs.

The George Washington University is privately endowed and is governed
a self-perpetuating Board of Trustees of which the president is an ex o
member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accred
agency, the Middle States Association of Colleges and Secondary Schools.
University is on the approved list of the American Association of Univer
Women and is a member of the College Entrance Examination Board.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue
19th, F, and 24th Streets, N.W. In immediately adjacent areas are the W
House, the World Bank, the United States Information Agency, the Corcor
Gallery of Art, the Department of State, the Department of the Interior
General Services Administration, the National Academy of Sciences, and
Kennedy Center for the Performing Arts.

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William Thomas Fryer, *Professor Emeritus of Law*
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Louis James Harris, *Professor Emeritus of Law, in Residence*
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James Oliver Murdock, *Professor Emeritus of Law*
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B.A. 1927, J.D. 1930, University of Iowa; LL.M. 1932, S.J.D. 1933, Harvard University; LL.D. 1957, University of Pittsburgh; Litt.D. 1957, Geneva College; L.H.D. 1957, Seton Hill College; LL.D. 1960, Dickinson School of Law

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* Professors, Associate Professors, Assistant Professors, and the Librarian of the Law Library constitute the Faculty of the National Law Center. The President of the University, the Vice President for Academic Affairs, the Registrar of the University, the Director of Admissions of the University, and the University Librarian are ex officio members of the faculty.

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David James Sharpe, *Professor of Law*
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Dudley Graham Skinker, *Clerk of the Trial Practice Court*
LL.B. 1940, George Washington University

O'Neal Smalls, *Professor of Law*
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versity

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B.S. 1952, M.S. 1953, State University of New York at Albany; LL.B. 1959, George Washington University

Summary of Registration, Fall Semester 1975–76

	1st year	*2nd year*	*3rd year*	*4th year*	*Graduate*	*Other*
Day	335	288	355	.....	58	7
Evening	117	107	96	75	200	65

Total: 1,703

[1] On leave of absence fall semester 1976.

APPENDIX: RECENTLY ESTABLISHE
REGULATION

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subje
to change in connection with the establishment of judicial processes. Bulle
and handbooks incorporating any changes will be issued as appropriate.

**The following resolution, submitted by the University Senate, was approved b
the University's Board of Trustees on October 19, 1968:**

Whereas, safety and order are essential preconditions of the learning proces
and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection o
free speech and freedom of assembly, and to safeguarding the right of law
protest on campus; and is committed equally to maintaining the peace an
safety of the campus, in the knowledge that all rights are in jeopardy whe
violence and civil disorder prevail over law and reason;

*Now, therefore, be it resolved by the Senate of The George Washington Uni
versity:* that in the event a demonstration at this University exceeds the boun
of free assembly and lawful advocacy, and demonstrators are engaging in un
lawful acts which cause or imminently threaten injury to persons or proper
or which obstruct or interfere with normal and necessary University activities
this body affirms the authority of the President, or other University official
designated to act in his absence, to take such reasonable steps, if possible afte
consultation with the Chairman of the Executive Committee of the University
Senate* and the President of the Student Body, as are required to restore an
preserve order; including, if deemed necessary and appropriate, suspension o
students or faculty engaging in such acts, and use of such law enforcement
personnel as are needed to effect the removal, arrest, and prosecution of la
violators. Any such suspension shall be reviewed by an appropriate tribuna
as soon after order is restored as is practicably possible.

**The following was approved by the University's Board of Trustees on Octobe
19, 1968:**

Any student suspended from The George Washington University on the
grounds of exceeding the bounds of free assembly and lawful advocacy shall
have his suspension reviewed by the Hearing Committee on Student Affairs† of
The George Washington University as soon after order is restored as is practi
ticably possible.

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by the
Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

* Amended January 18, 1973.

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of t University,

may be punished for his conduct by dismissal from the University, or by sor lesser disciplinary action, through procedures established within the Univers for the government of its members.

In order to insure due process, any student subject to dismissal or oth disciplinary action on the grounds of violating any of the premises of thi resolution shall have, at his discretion, the right of review of the action by th University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by t Student-Faculty Committee on Appeals.



ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

COLLEGE OF GENERAL STUDIES, Dean of the College

NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

UNDERGRADUATE AND GRADUATE CATALOGUE (Arts and Sciences, Education, Government and Business Administration, Public and International Affairs)

SCHOOL OF MEDICINE AND HEALTH SCIENCES, Admissions Office, School of Medicine and Health Sciences

SCHEDULE OF CLASSES: FALL (Preregistration and Revised) AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart. Sc.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.F.S.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S.F.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.), Bachelor of Science (B.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.[Am.Prac.]), and Doctor of Juridical Science (S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. [C.E.]), Bachelor of Science (Electrical Engineering) (B.S. [E.E.]), Bachelor of Science (Mechanical Engineering) (B.S. [M.E.]), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), Engineer (Engr.), Applied Scientist (App.Sc.), and Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelor of Science in Human Kinetics and Leisure Studies (B.S. in H.K.L.S.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Master of Arts (M.A.), and Master of Science in International Affairs (M.S.I.A.)



THE GEORGE WASHINGTON UNIVERSI

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

THE DIVISION OF EXPERIMENTAL PROGRAMS, 1973

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THE SCHOOL OF ENGINEERING
AND APPLIED SCIENCE 1976–77
WASHINGTON, D.C. 20052



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THE CALENDAR 19

1976	FALL SEMESTER
August 30	Orientation for students from foreign countrie
August 31	Orientation and placement tests for enterin *Tuesday*
September 1	Advising for all students *Wednesday*
†*September 2–4*	Registration—Tompkins Hall of Engineering *Saturday*
	Application for February graduation due as p istration
September 6	Labor Day (holiday) *Monday*
September 7	Classes begin *Tuesday*
November 1	Application for spring semester financial aid *day*
November 18	D.Sc. dissertations of February candidates due
November 24	Thanksgiving recess begins after last class *Wed*
November 29	Classes resume *Monday*
December 1	Master's theses of February candidates due *W*
December 7	Last day of fall-semester classes *Tuesday*
December 13–22	Examination period *Monday–Wednesday*

1977	SPRING SEMESTER
January 10	Orientation for students from foreign countries
January 11–12	Advising for all students *Tuesday–Wednesday*
†*January 13–15*	Registration—Tompkins Hall of Engineering *Th Saturday*
	Application for May graduation due as part of tion
January 17	Spring-semester classes begin *Monday*
January 20	Inauguration Day (holiday) *Thursday*
February 1	Deadline for submission of 1977–78 freshman financial aid applications *Tuesday*
February 21	Winter Convocation (holiday) *Monday*
March 1	Deadline for submission of 1977–78 continuin transfer undergraduate student financial aid app *Tuesday*
March 12	Spring recess begins after last class *Saturday*
March 21	Classes resume *Monday*
March 23	D.Sc. dissertations of May candidates due *Wednes*
April 1	Deadline for submission of Summer Sessions and 78 graduate financial aid application *Friday*
April 8	Master's theses of May candidates due *Friday*
April 22	Last day of spring-semester classes *Friday*
April 28–May 7	Examination period *Thursday–Saturday*
May 8	Commencement *Sunday*

* This calendar is subject to change.

† The registration procedure and hours of registration will be stated in the *Schedule of* which is available well in advance of each semester.

1976

JULY

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TO ALL PROSPECTIVE STUDENTS:

The School of Engineering and Applied Science has been in continuous session since 1884, and offers programs of study leading to Bachelor's, Master's, Professional and Doctor's degrees. Its prime objective is to develop in the student the precious asset of a well-trained mind which may be applied to the attainment of our many national objectives. In these changing times, it is necessary to search for quality. Students and faculty have the opportunity of assisting in the planning and implementation of educational programs. Examination is made periodically of the School's objectives and how they relate to those established by the Engineering Council for Professional Development (ECPD). Emphasis includes such items as the student's basic and advanced levels of education and role in present and future society.

This catalogue describes the programs and requirements for undergraduate and graduate study in the School of Engineering and Applied Science and includes information on the Cooperative Education Program in Engineering and the Joint Institute for Acoustics and Flight Sciences (JIAFS).

The Cooperative Education Program in Engineering provides the undergraduate engineering student with the opportunity to obtain an enduring foundation in engineering education by combining academic learning with practical, first-hand experience in the student's chosen field of engineering. The student's earnings will help to pay for a major part of the cost of an engineering education.

JIAFS was created by the joint efforts of the NASA-Langley Research Center and the School of Engineering and Applied Science. The education and research opportunities offered in the program combine the academic resources of George Washington University and the professional research resources and facilities of NASA-Langley Research Center to prepare qualified graduate students for careers in research, development, design, and teaching.

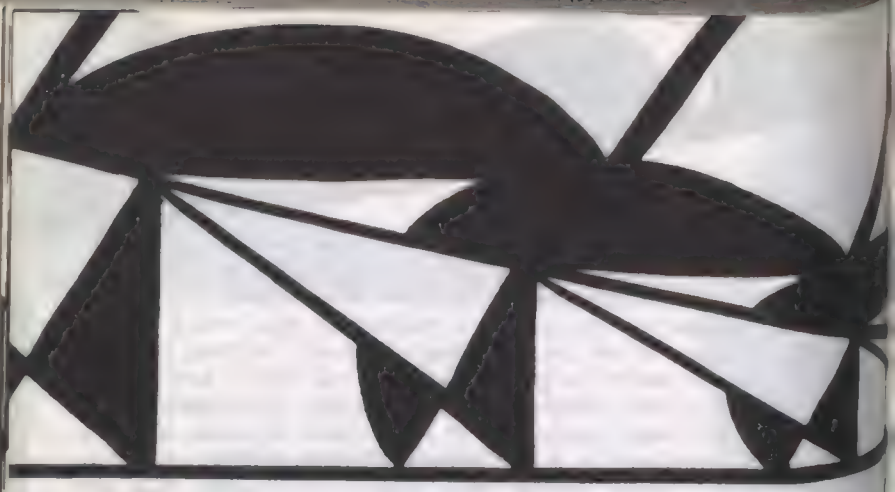
The School of Engineering and Applied Science is a professional school in a university comprised of eight degree-granting schools and colleges. The environment of the nation's capital is very favorable for the intellectual and cultural development of the student. The metropolitan Washington area contains the second largest concentration of research and development in the United States, and the engineering component of this activity is similarly extensive offering many employment opportunities to students after graduation.

The atmosphere of the School is one of serious-minded effort toward mature development. Being a small school, it recognizes the individual as the single most important element in the educational process. The student body, undergraduate and graduate, has a primary interest in design, research, development, and management in both scientific and engineering activities. Many alumni of the School are successfully engaged in all fields of engineering—in science, management, government, and education.

The philosophy of the School, which might be summarized as "education for creativity, not conformity," has through the years reflected the many subtle and profound changes in the engineering profession.

The faculty of the School and I look forward to a closer and more fruitful relationship with you. If you need additional information, please do not hesitate to call upon the Department Chairmen or me.

HAROLD LIEBOWITZ
Dean



THE STUDY OF ENGINEERING

The Meaning of Engineering and Applied Science

THE RESPONSIBILITIES AND ACTIVITIES of the engineering profession extend into every aspect of industry and research, and into many fields of commerce and the arts. Engineers have faced and continue to face problems in the production and distribution of all types of manufactured products, including the design of mechanical, electrical, and chemical processes, of equipment and of plants in which such products are made; in the design and construction of an infinite variety of structures such as bridges, tunnels, harbors, and dams; in aircraft design and construction, including complicated electronic equipment for control, guidance, and communication; in the operation of transportation systems; in the wide spectrum of activities existing in the automotive industry; in the missile and space programs; in the generation and transmission of power; in the modern phases of communication; in the control of traffic; in city planning; in public health and sanitation as it affects the environment; in energy resources and power; and in ventilation and refrigeration. This list of applications is far from exhaustive; it does indicate, however, that engineering is a broad profession in which there are many specialists.

The Relationship of Engineering and Science

In any discussion of engineering and applied science, it is important to emphasize the distinction between engineering and science. The President's Scientific Advisory Committee points out that the engineer and scientist each play an important role on a team. "The scientist is one who seeks to extend the boundaries of knowledge in his chosen field. The engineer has the task of combining the knowledge of science with a knowledge and awareness of the needs and limitations of human beings and of a human society to develop and create things for human use. . . . While scientists have uncovered the basic knowledge, it is the engineers who have created the tangible tools, materials, and products that have revolutionized our daily lives, our communications, living, and our national defense."

The work of engineers is a focal point at which scientific knowledge, the use of such knowledge as a service to society, financial material, human resources, and society's needs are interrelated. The engineer is concerned, therefore, with the means for operating a dynamic society. He or she must consider not only whether the knowledge that exists will enable the creation of a workable product, but also how the product can be built, who will use it, and how such use will affect the environment in which it will operate.

The Professional Engineer

Engineers are concerned with the quality and preservation of human life. Engineer, as the term is used in this catalogue and as it is commonly understood in our society, refers to the person who makes use of the advances of science and technology in an economically feasible manner for the benefit of society. This process is complex and challenging. Although the content of engineering curricula is certainly scientific, the engineer has not lost a sense of purpose in serving as an intellectual agent in the practical world. This responsibility of the engineer arises from the breadth of the implications of engineering for the whole of society as well as from the depth of the requirements for competence. Technology has radically rearranged human life in our time. There are many who believe that, although the threshold of space has been crossed, the union of medical and engineering practice has been achieved, and breakthroughs have been made in other areas, this impact of engineering on modern life is just a modest preview of the engineering of tomorrow.

Engineering Education and the Student

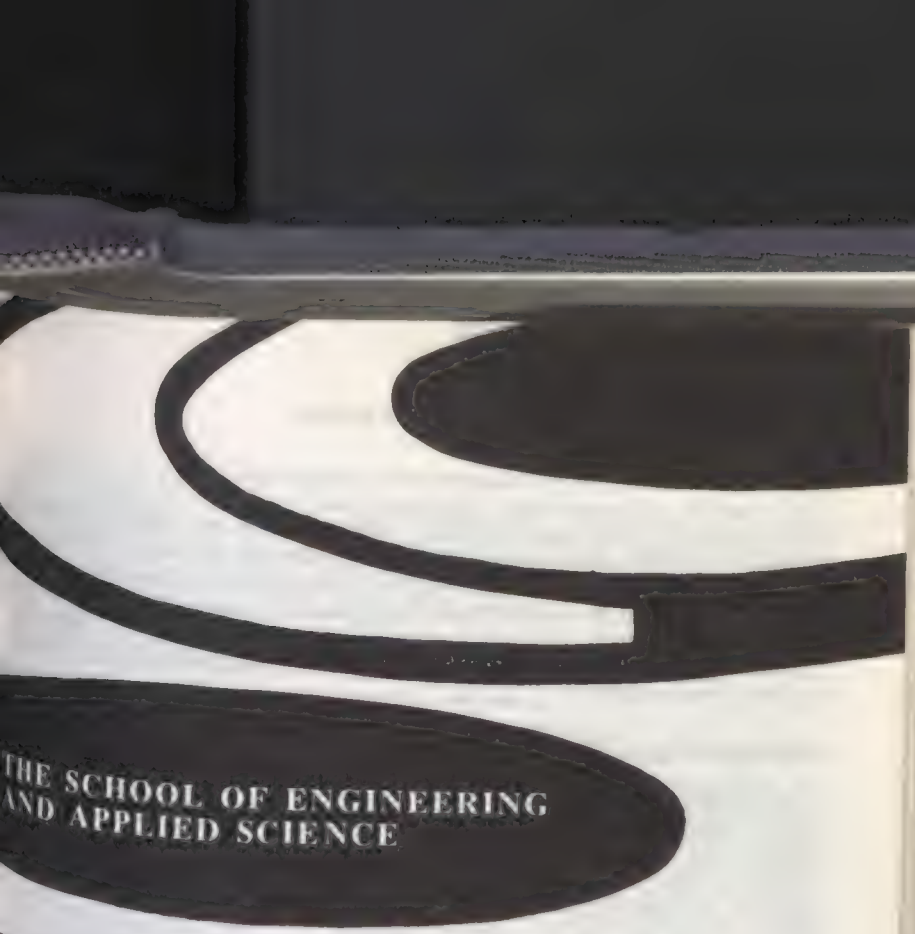
Rapidly changing and advancing engineering activity requires an education for the future based on fundamental principles of science useful in applications to a dynamic, advanced society. In the fields of engineering and applied science there is no substitute for demonstrated ability and competence to solve the problems faced. Without question, achievement in particular courses of study is important. Equally important, however, is the ability to analyze and interpret all the aspects of a problem, to formulate solutions, and to evaluate those solutions in the light of all available information. The attainment of this objective is the basis for undergraduate education. The undergraduate program of the School of Engineering and Applied Science is subjected to periodic evaluation and appraisal by the faculty.

The curricula of the School of Engineering and Applied Science are founded on one basic principle—to assist the student in preparing for a career in engineering and applied science. This philosophy requires that the student master the principles on which future practice will be based. An education centered on that meaningful junction between theory and practice enables the engineer to follow the many interests and opportunities that may develop.

It should not be assumed, however, that only the intellectual elite should consider the study of engineering and applied science. Engineering, like medicine, law, education, science, history, government, and other disciplines, requires scholars. But in any of these areas, even though the prospective student has not achieved high scholastic standing, if there is genuine interest in the subject, a place can probably be found. Those who are moderately well-endowed with mental ability and who are interested and willing to work will

find in engineering and applied science a rich and varied field of study wh
can lead to satisfaction and success. It is difficult to make generalizations
this area, but if a student has demonstrated an aptitude for mathema
science, and English, he or she will probably find the work of engine
and the study of engineering and applied science satisfying and challeng
Innate intellectual curiosity and the desire to learn and to work hard are go
indicators of success. College Board examinations may reveal the capacity
manage further study in mathematics and science and their applications
engineering. No school or college can "give" an education. It can offer
the opportunity to "get" an education. The George Washington Univers
School of Engineering and Applied Science is a small school which provi
an opportunity for close liaison with faculty members, as well as the oppo
tunity to participate in matters of student concern—in organizations, a
other student activities. The School recognizes the individual as the m
important element in the educational process.





THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

History

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE was organized October 1, 1884, as the Corcoran Scientific School of Columbian University and was situated in the University Building then at 15th and H Streets, N.W. The School was named in honor of William W. Corcoran, Trustee and President of the Corporation from 1869 to 1888. Day and evening courses were offered in literature, science, and technology and led to the degrees of Bachelor of Science, Civil Engineer, Mechanical Engineer, and Mining Engineer. The School was among the first to accept women for degree candidacy in engineering.

In 1903 the Corcoran Scientific School, the School of Graduate Studies, and the Columbian College were merged into a single Department of Arts and Sciences. Engineering degrees were made graduate.

Administrative changes led to The Washington College of Engineering being initiated in 1905 as one of the several semi-independent undergraduate colleges of the University, each with its own Board of Trustees. The College provided instruction leading to undergraduate degrees in engineering and architecture. In 1909 the name of the College was changed to the College of Engineering and Mechanic Arts, and the curricula were revised to give the student a thorough understanding of the theory underlying engineering practice. Emphasis was placed on the development of a knowledge of scientific principles upon which the student could build and by which he might solve new problems as they are met in practice.

The name of the School was changed again in 1914 to the College of Engineering and later to the School of Engineering. Architecture was dropped from the curriculum, and degrees were limited to the field of engineering. However, the primary emphasis upon principles rather than technology which had characterized the School since 1903 was continued and has remained to this day as one of the important distinguishing features of the School.

In 1962 the name of the School became the School of Engineering and Applied Science.

Academic Status

The George Washington University is accredited by its regional accred agency, the Middle States Association of Colleges and Secondary Schools

The University is on the approved list of the American Association of versity Women and is a member of the College Entrance Examination B

The undergraduate curricula in Civil Engineering, Electrical Engineer and Mechanical Engineering are accredited by the Engineers' Council for fessional Development.

University Policy on Equal Opportunity

In accordance with the stated policy of its Board of Trustees and in formity with federal laws and regulations, The George Washington Uni sity does not discriminate against any person on the bases of sex, race, co religion, or national origin in any of its education or employment program activities. Federal regulations implementing Title IX of the Education Amen ments of 1972 call for an explicit statement that the requirement not to criminate on the basis of sex extends to employment in and admission to programs and activities.

Inquiries concerning the application of this policy and federal laws regulations concerning discrimination in education or employment progra and activities may be addressed to the Office of the University's Coordin of Equal Opportunity Programs or to the Director of the Office of C Rights of the Department of Health, Education, and Welfare.

Undergraduate Study

THE UNDERGRADUATE PROGRAM is intended to provide a solid foundation in basic principles, concepts, and techniques underlying engineering and appl science, on which the individual may build technical competence in a vari of areas as his professional career develops. It is preparation for a career engineering or applied science, as it exists today and as it may develop in future.

Undergraduate study is the formal beginning of a life-long continuing pr gram of education. The School provides an environment that encourages a fosters the attitudes and disciplines essential to professional growth. The gra uate, when he receives his Bachelor's degree, is prepared for productive wo in his chosen field; he is also prepared for further development and progres both formal and informal. The undergraduate curricula include courses in t humanities and social sciences to the extent necessary to develop a reasonable understanding and appreciation of these areas of knowledge.

Admission to the engineering program indicates that the student possesses at least minimum preparation and the probable capacity to meet the academic demands of this School. Since the School cannot predict either the student's response to the academic demands or the program to follow for the most effective development, the undergraduate program has been designed to offer a variety of experiences through which the student may find the best path to maturity and growth in educational development.

The School is a place for learning; for experiencing adventures of the mind and of the hands; for the formulation, exchange, and exploration of ideas. During his undergraduate years the student is led to strengthen his skills in analysis and his talent for creative activity, through liberal use of project-type laboratory work. Independent thought and original ideas receive higher evaluation, in the appraisal of student achievements, than the rote recital of information.

To provide the undergraduate engineering student with the opportunity to obtain an enduring foundation in engineering education by combining academic learning with relevant, real-world employment which provides practical, first-hand experience in engineering, the School of Engineering and Applied Science has a Cooperative Education Program in Engineering in which arrangements have been made with leading industrial and governmental organizations for student employment at prevailing salary rates. Every effort is made to place the student in positions of employment that provide the best possible engineering experience consistent with career plans. These work periods provide the student with income that may enable him to finance the major portion of his tuition and other expenses. Entering freshmen, as well as transfer students from community colleges whose completed work is equivalent to requirements in this program, can be admitted to the Cooperative Education Program in Engineering.

ADMISSION TO UNDERGRADUATE STUDY

The School admits those applicants who can benefit themselves and society by disciplined intellectual effort in its environment. In the selection process, there is no discrimination because of sex, race, color, religion, or national origin.

Admission is the first selective step in a long series of qualifying steps the student will take in his progress toward professional competence in engineering. It indicates the School's belief that the applicant has at least the minimum preparation and ability to complete the curriculum successfully.

The applicant must be of good character and must have an academic background appropriate for the program of studies contemplated.

Application for Admission

An applicant for admission obtains from the Office of Admissions of the University an application blank which he must fill out completely and return with the $10* application fee.

Students From U.S. Institutions

Records presented become the property of the University and *cannot* be returned.

*Application fee must be by check or postal money order, payable to George Washington University. The application fee is waived for a student applying for readmission who was registered in degree program at the time of his last registration at this University and has not since registered another institution.

FRESHMAN ADMISSION

Consideration for admission is based on the following:

1. An acceptable certificate of graduation from an accredited high sch showing at least 15 units*;

2. The principal's statement that the applicant is prepared to undertake c lege work;

3. Scores on the following College Entrance Examination Board tests: Scholastic Aptitude Test and the English Composition Achievement Test.

The qualifications of applicants who, because of unusual circumstances, not meet the above requirements will be considered by the School, which m prescribe admission tests.

Nine and one-half of the 15 units required for entrance must be distri uted as follows: three in English, two in algebra, one in plane geometry, one half in plane trigonometry, one in physics or chemistry, and two in one foreig language or history. General science may *not* be counted in satisfaction of t science requirement but may be counted as an elective unit.

It is recommended that *both* physics and chemistry be studied in high scho A high school course in solid geometry is recommended as a firm foundati for college mathematics.

An applicant must arrange to have sent directly *from his school to the Offi of Admissions* the academic record of his first seven terms in secondary schoo together with a personal evaluation and recommendation from his principa This information may be supplied on a form provided by the University or on a standard form used by the secondary school provided all essential informa tion is included.

Quantitative Deficiency.—A graduate of an approved high school who lack not more than two units of the required subjects and who presents 15 accept able units may be admitted to a prescribed program which includes courses t make up his deficiencies.

Applicants who wish to begin study in the fall semester should formulate plans early in the senior high school year. Although the University prefers to have applications submitted during the fall semester of the senior high schoo year, applications may be submitted until May 1. Students graduating at mid term wishing to begin study in the spring semester *should* apply no later than December 1. Applications and all required credentials of students wishing to begin study in either the first or second term of the summer session must be received prior to March 1.

Although decisions on most applications for the fall semester will require sub mission of seventh-term grades and senior-year test scores, an earlier decision will be given after September 1 to a student whose application becomes com plete with a secondary school record through the junior year and junior-year test scores, provided these records clearly establish admissibility.

Early Admission Plan.—Unusually well-prepared students who have com pleted the junior year in high school may be considered for admission if they submit special credentials and have the unqualified recommendation of their principal or counselor. Inquiries should specifically mention the Early Admis sion Plan.

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* A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods of prepared classroom work.

TRANSFER STUDENTS

Transfer students from other institutions (see page 22 for minimum residence requirement) should submit application and required credentials prior to June 1 for the fall semester, November 1 for the spring semester, April 1 for the summer sessions.

The transfer student must be in good standing as to scholarship and conduct. A student who has been academically dismissed or suspended more than one time will not normally be considered for admission.

An applicant who has attended one or more institutions of higher learning must request *each registrar* to mail directly *to the Office of Admissions of the University* a transcript of his or her record, *even though credits were not earned.*

If an applicant has fewer than 30 semester hours of acceptable work (*C* or better in academic courses from an accredited institution), at the time the application is submitted, the applicant must request that his or her high school record and College Examination Board or ACT test scores be sent to the Office of Admissions.

If high school units are not shown on the college transcript, the applicant must request that the high school record be sent to the Office of Admissions.

Students From Foreign Institutions

Application, required records, and scores on the *Test of English as a Foreign Language* (see below) must be received from *all foreign applicants* no later than March 1 for the fall semester and November 1 for the spring semester.

REQUIRED RECORDS

At the time the application is sent, the applicant must request the educational institution previously attended to send directly to the Office of Admissions copies of official certificates and records listing subjects studied, grades received, examinations taken and degrees received. Certified copies of diplomas and certificates from all secondary schools, colleges, and universities attended are required. Records of state examinations and certificates are also required. These records become the property of the University and cannot be returned.

These documents should be in the language in which the institution keeps its official records. If they are in a language other than English, the copies which are sent should be accompanied by an English translation.

LANGUAGE TEST

Students whose native tongue is not English should take the TOEFL test (Test of English as a Foreign Language) or the ALIGU test (American Language Institute, Georgetown University). Students are responsible for making arrangements for taking these tests. Foreign students abroad should consult with the nearest U.S. Embassy for information on arrangements for taking ALIGU.

Those interested in TOEFL should address inquiries to the following agencies:

1. All European countries (including Cyprus, Great Britain, Iceland, and Ireland):
   CITO
   Postbus 1034
   Arnhem, Netherlands

2. All Middle Eastern and North African countries (except Israel):
   American Friends of the Middle East
   Abou Shakra Building
   Rue Bliss (Manara)
   Beirut, 2500 Lebanon
3. Hong Kong:
   Institute of International Education
   408 J. Hotung House, Fourth Floor
   5/15 Hankow Road, Kowloon, Hong Kong
4. India:
   Bureau of Educational Research
   Ewing Christian College
   Allahabad, U.P., 211003, India
5. Republic of China:
   Language Center, 2-1 Hsu-chow Road
   Taipei, Taiwan (100), Republic of China

All other applicants should address inquiries to TOEFL, Educational Test
Service, Princeton, N.J. 08540, U.S.A. The completed application form sho
be returned to the appropriate agency well in advance of the beginning of
semester for which the applicant seeks admission. The test fee remitted w
the application entitles the student to have the test score sent to three differ
institutions. Registration for the *Test of English as a Foreign Language* or th
ALIGU test does not constitute application for admission to George Washi
ton University.

The TOEFL Bulletin of Information, obtainable without charge, contains
description of the test as well as rules regarding application, fees, reports, an
the conduct of the test; lists of examination centers; examination dates; and a
application blank. On the application for the test, the student should specif
that the scores be sent to the appropriate admissions office at this Universit
(see "Undergraduate Admission," pages 13–15, or "Graduate Admission
page 25).

In addition to the TOEFL or ALIGU tests an admitted student may be re
quired to take an English Proficiency Test prior to registration. Results of th
test will determine the courses the student will be permitted to register for
the program of study. If the knowledge of English is inadequate to enable th
student to undertake any academic work, the student will not be permitted t
register for any courses other than English and will be required to study Engli
on a full-time basis either at this University or at a recognized language in
stitution.

SPECIAL ENGLISH COURSES FOR INTERNATIONAL STUDENTS

The extensive experience of the Department of English with the language needs
of international students has been synthesized into a comprehensive English
Language Program that includes the following courses:

1 **English for International Students**

Elementary grammar, reading and vocabulary. Course meets 15 class hours
and five monitored laboratory hours a week. Further laboratory work en
couraged.

2 English for International Students

Lower intermediate grammar, reading, and vocabulary. Course meets 10 class hours and five monitored laboratory hours a week. Further laboratory work encouraged.

3 English for International Students

Higher intermediate grammar, reading, and vocabulary review for international students not yet ready for extended training in composition. Course meets four hours a week. Optional laboratory work.

4 English for International Students

Semi-intensive higher intermediate grammar, reading, vocabulary review, and conversation, for international students not yet ready for extended training in composition. Course meets 10 class hours and three monitored laboratory hours a week. Further laboratory work encouraged.

5 English Composition for International Students

Extended writing practice for international students showing high degree of proficiency in use of English. Development of writing skills; study of expository techniques and library research methods. Course meets four hours a week. Students completing Engl 5 with a grade of *A* or *B* will receive academic credit for the course and may enroll in Engl 11 or 12 to fulfill the Columbian College undergraduate requirement in English.

The language laboratory is available to all students in the English Language Program. The laboratory contains a library of tapes that accompany the printed texts and a variety of listening and recording equipment, including individual recording and playback equipment.

Admission to a particular English class is determined by a suitable series of objective and nonobjective tests.

The English Language Program is administered by the College of General Studies and is offered in cooperation with the Department of English, Professor J.P. Reesing, Jr., Chairman. The English for International Students Program is under the direction of Dr. George Bozzini.

Readmission

A student previously registered in the University who was not registered on campus during the immediately preceding semester (summer session excluded) must apply for readmission. Final dates for applying are the same as those for "Undergraduate Admission" (see page 14), or "Graduate Admission" (see page 25). If the student applies for a degree program and was previously registered as a nondegree student, or if a student has attended one or more higher institutions while absent from the University, the student must have complete, official transcripts sent to the appropriate office at this University from each institution attended. Applications for readmission are considered on the basis of regulations currently effective.

The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time last registered at this University and who has not since registered at another institution.

Advanced Tuition Deposit

Upon notification of acceptance, a $100 advanced tuition deposit will b
quired of all full-time undergraduate students including those readmitted.
deposit is not due until May 1 for students entering in the fall semester, o
December 15 for students entering in the spring semester. The deposit is
ited toward tuition and is not refundable.

Advanced Standing

CREDIT BY EXAMINATION

Assuming there is no duplication of course work earned, a maximum o
semester hours of credit may be assigned upon admission to the Universit
each or any combination of the following:

College Entrance Examination Board Advanced Placement Tests (APT
Credit is assigned for examinations passed with scores of 4 or 5 on the basi
a score report sent to the Office of Admissions from the Educational Test
Service at the student's request. Examinations passed with scores of 3 w
considered for credit or placement if the student arranges to have the exam
tion paper sent to the Office of Admissions. The Advanced Placement Test
administered in the secondary school in May of each year. Normally only
dents who complete a course designated as Advanced Placement are prepa
for the examination. Arrangements for the examination are the responsibi
of the applicant and should be made through the secondary school attend
or with the Program Director, College Entrance Examination Board Advan
Placement Examinations, Box 592, Princeton, N.J. 08540, or Box 1025, Ber
ley, Calif. 94701.

College Entrance Examination Board College-level Examination Progra
(CLEP).—CLEP offers two types of examinations: General and Subject Exa
nations. CLEP General Examinations are offered in five areas: mathematics
social sciences, humanities, natural sciences, and English composition. CL
Subject Examinations measure achievement of specific college-level courses
are offered in more than 20 subjects.

Upon admission to degree candidacy, credit is assigned for the General Exa
inations, with the exception of the English composition examination, passed
the 50th percentile or above (college sophomore norms). Credit is assigned
the Subject Examinations passed at the level recommended in the College Boa
model policy. A candidate for a degree from any school at this University mu
seek departmental approval *prior* to taking the examination to receive credit
a CLEP Subject Examination. Credit may not be earned by passing the exam
nation after having taken the equivalent course. Arrangements for the exam
nations are the responsibility of the applicant and should be made with the C
lege Entrance Examination Board College-Level Examination Program, Bo
592, Princeton, N.J. 08540.

CREDIT FROM HIGHER INSTITUTIONS

Where there is no duplication involved either through course work or examin
tion, advanced standing may be granted for work successfully completed
accredited institutions of higher learning. It will be granted only when it mee
the requirements for the degree sought at this University and may be accepte

provisionally. Work of low pass grade (*D* or the equivalent) will not be considered for transfer.

Except for students transferring to the School of Government and Business Administration from a two-year or junior college in which case no more than 60 semester hours credit may be assigned, there is no strict limit to the total amount of credit that may be assigned. However, a student must satisfy the residence and course requirements for the degree sought at George Washington University.

CREDIT FROM TECHNICAL INSTITUTES

Advanced standing may be granted for work successfully completed at technical institutes. Credit will be granted for transferred work only when the applicant passes successfully the required validation examination. Arrangement for the examination should be made with the appropriate Department of the School. In any event, no more than 30 semester hours of credit for technical work will be granted in transfer for those who graduated from a two-year technical institute. A maximum of 60 semester hours of credit for technical work may be granted in transfer for those who graduated from a four-year technical institute.

CREDIT FROM SERVICE SCHOOLS

A limited amount of credit may be assigned for selected service school instruction received since 1941. No more than 30 semester hours may be assigned for a combination of service schools and examinations referred to above. Veterans should submit to the Office of Admissions photostatic copies of their service school records, indicating courses successfully completed with sufficient identification of the course to locate it in the *Guide to Evaluation of Educational Experience in the Armed Forces.*

CREDIT EARNED THROUGH UNITED STATES ARMED FORCES INSTITUTE (USAFI)

Credit is assigned for approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

REGULATIONS

Regulations regarding REGISTRATION, FEES, AND FINANCES *are stated on pages 176–180, other University regulations, on pages 185–189.*

Attendance

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered. Regular attendance is required. A student may be dropped from any course for undue absence.

The student is expected to attend every meeting of the course in which he is registered, fully prepared to carry on the work required. The student is held responsible for all work in the course, and all absences must be excused before provision will be made for him to make up the work missed. Excuses for ab-

sences from examinations which have been announced in advance can b
tained only by written application to the instructor in charge of the cours

Academic Work Load

A full-time undergraduate student who is not on probation may register f
more than 20 semester hours. A student employed more than 24 hours a
who is not on probation may take no more than 10 semester hours. In e
tional cases these limits may be exceeded with the Dean's permission.

A student previously unemployed who accepts employment after registra
must immediately report that fact to the Dean so that his schedule ma
adjusted if necessary.

Advisory System

The School of Engineering and Applied Science encourages a close fac
student relationship. Every entering undergraduate student is assigned a per
nent faculty adviser to assist him in orienting himself in the professional
cipline. Faculty advisers counsel students on their programs of study,
achievement and maintenance of satisfactory scholastic performances, pro
sional development, and extracurricular activity as part of the educational p
ess. The adviser represents the student in all cases requiring faculty action

Students must obtain their advisers' approval of programs of study prio
registration. Until a student has completed the work required for the deg
he must consult his adviser in all academic matters. However, an adviser m
not deny a student entry into any course or activity to which he is entit
under the regulations of the School.

All students are encouraged to discuss college problems with their advisers
instructors at any time; and parents or guardians are invited to consult w
the Dean, Department Chairman, and advisers concerning any student pro
lems.

Faculty advisers discharge their counseling duties in accordance with t
high principles of their professional responsibility; however, the final respo
sibility for a student's action lies wholly with the student.

Scholarship

For scholarship requirements for graduation, see "Graduation Requirements
page 22.

Grades.—Grades are mailed to the student through the Office of the Regi
trar at the close of each semester. They are not given out by instructors.

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfac
tory; *D*, Low Pass; *F*, Fail. Whenever a grade has not been assigned, the sym
bol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) or the symbo
(Unauthorized Withdrawal) will be recorded. The symbol *I* indicates that
satisfactory explanation has been given the instructor for the student's inabil
to complete the required work of the course.

At the option of the instructor, the grade of *I* may be recorded if a studen
for reasons beyond his control, is unable to complete the work of the course, pr
if the instructor is informed of, and approves, such reasons before the date whe
grades must be reported. The grade may be used only if the student's prior p
formance and class attendance in the course have been satisfactory. Any fail

o complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, that instructor may initiate an appropriate grade change. Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or required paper) must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An *I* cannot be made up after the lapse of one calendar year.

Quality-point Index.—Scholarship is computed in terms of the quality-point index obtained by dividing the number of quality points by the number of semester hours for which the student registered.

Quality points are computed from grades as follows: *A*, four points; *B*, three points; *C*, two points; *D*, one point, *F*, no points, for each semester hour for which the student registered. Courses marked *W* or *I* are not considered in determining the index, except that courses marked *I* will be considered when a formal grade is recorded. Grades in courses at another institution are not considered in computing the quality-point index.

Mid-semester Warning.—At the end of the seventh week of each semester, instructors report to the Dean the names of students whose scholarship is unsatisfactory. On receipt of a warning notice the student must consult the instructor and adviser immediately.

The adviser may prescribe diagnostic tests and/or remedial study to be completed before the end of the current semester.

Probation.—A full-time student (one taking 12 semester hours or more) whose quality-point index based on all courses attempted in his most recent semester falls below 2.00 for that semester, or who receives two grades or more of *F* in one semester, will be placed on probation. A student enrolled for less than 12 semester hours during the fall or spring semester and a student enrolled during the summer sessions is subject to probation or suspension on the basis of his record for 12 semester hours, rather than on his record in any one semester. The probation period is for one semester for full-time students, or the next 12 semester hours of study for part-time students.

If a student earns a quality-point index of at least 2.00 in all courses taken during the period of probation and receives no grade of *F* during this period, he is removed from probational status.

If a student fails to achieve a quality-point index of 2.00 for all courses completed during the probation period, he is continued on probation for an additional period of one semester or 12 semester hours of study.

Upon being placed on probation, a student must undertake the Engineering Student Probation Program of testing, counseling, and remedial work available at the Counseling Center. A student on probation is required to follow a program of study prescribed by his adviser and Department Chairman, and is cautioned not to take more than 12 semester hours of study. The student is not eligible to participate in student activities.

Suspension.—If a student receives two or more grades of *F* during a probation period he will be suspended. If a student fails to achieve a quality-point index of 2.00 in a second consecutive period of probation, he will be suspended. A student who has been on probation for three periods and who fails to achieve a quality-point index of 2.00 in the third period or any subsequent semester will be suspended.

DEAN'S HONORS LIST

The Faculty of the School recognizes meritorious scholastic achieve
Dean's Honors List, containing the names of candidates for undergra
grees whose scholastic achievement satisfies all of the following requi
1. The student must have completed a minimum of 13 semester hou
semester with a quality-point index of 3.00 or higher and with no m
one grade of *C*.
2. No grade below *C* may have been received during the qualifyin
3. No disciplinary action may have been taken with respect to the
The Dean's Honors List is prepared at the end of the fall and sprin
ters and displayed in an appropriate public place in the School. A no
made on the student's record each time his name is included in the Lis

Use of Correct English

Any student whose written or spoken English in any course is unsati
may be reported by the instructor to the Dean. The Dean may assign
mentary work, without academic credit, varying in amount with the n
the student. If the work prescribed is equivalent to a course, the regular
fee is charged. The granting of a degree may be delayed for failure to
up any such deficiency in English to the satisfaction of the Dean.

Graduation Requirements

See page 187 for general requirements for graduation.

RESIDENCE

A minimum of 30 semester hours must be completed in residence. Su
work may be counted. Unless special permission is granted by the De
study elsewhere, the work of the final year must be completed in residence

SCHOLARSHIP

To be eligible for graduation a student must have a quality-point index
least 2.20 in those technical courses specified in the fifth through the e
semester of the curriculum.

HONORS

With Distinction.—A Bachelor's degree may be conferred "With Dis
tion," at the discretion of the Faculty, if a student attains a quality-point in
of 3.50 or higher on all work taken at this institution. To be eligible for
honor a student must have completed at this institution at least one-half of
work required for the degree.

Special Honors.—A Bachelor's degree may be conferred with "Special H
ors," at the discretion of the Faculty, for outstanding achievement in the
dent's senior year work on recommendation of the Faculty, under the follow
regulations:

1. The student must have candidacy for Special Honors approved by the
partment chairman representing the major field not later than the beginning
the senior year.

2. The student must meet such other conditions as may be set at the time candidacy is approved.
3. No student will be awarded Special Honors unless a quality-point index of at least 3.00 is achieved on all work taken at this institution.
4. To be eligible for Special Honors a student must have completed at this institution at least one-half of the work required for the degree.

UNDERGRADUATE CURRICULA

The four-year undergraduate curricula lead to the degree of Bachelor of Science, with parenthetic designation of the major; for example, Bachelor of Science (Electrical Engineering). Students who are deficient in preparation require a longer period; those who are admitted with advanced standing or who attend summer sessions can complete the requirements in less time.

The program of the first four semesters (2 years) is common to all curricula and provides the essential broad base of scientific principles and mathematical techniques necessary for the professional courses of the last four semesters, together with an appropriate background in the humanities and social sciences (see below).

A minimum total of 130 semester hours is required to qualify for the degree. However, students are encouraged to elect additional course work above the required minimum to the extent that their interests and the School's offerings permit.

Degrees are offered in Civil Engineering, Electrical Engineering, and Mechanical Engineering. Students in Civil Engineering may select options in Computer-oriented, Environmental-oriented, and Geotechnical Civil Engineering; students in Mechanical Engineering may select options in Energy, Resources and Power-oriented and Computer-oriented Mechanical Engineering. Electrical Engineering provides options in Computer Science and Premedical Engineering.

The student is assisted by a faculty adviser, who approves the program each semester prior to registration. For the guidance of the student and the adviser, every beginning student takes the School's placement examinations in English, reading, algebra, and trigonometry and, if deficient in any of these areas, must take remedial work in the area of deficiency.

Courses in the Humanities and Social Sciences

The program in the humanities and social sciences for engineering students assists them in acquiring knowledge which will permit an understanding of the social and humanistic elements of the past and present and an analysis of problems facing society today. The ultimate goal is to help the engineer have a better understanding of society and an appreciation of the engineer's role and responsibilities within it.

Since the education of an engineering student is, by necessity, oriented toward technical subjects, the program in the humanities and social sciences should not emphasize technical aspects and skills, but should rather consist of courses which broaden the outlook. As a consequence, courses in subjects such as accounting, finance, industrial management, introductory languages, and personnel administration should not be included in the humanities and social sciences program. On the other hand, courses in areas such as anthropology,

economics, fine arts, geography, history, literature, philosophy, poli
ence, psychology, and sociology are considered appropriate.

Each engineering student is required to prepare, with the assistanc
faculty adviser, a program of courses in the humanities and social
explaining how the program meets the purpose stated above. The
program must include a minimum of 18 semester hours and must be
by both the adviser and department chairman.

Graduate Study

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE offers graduate stu
ing to the degrees of Master of Science, Master of Engineering Admini
Professional Degrees of Engineer and Applied Scientist, and Doctor of

In its graduate programs, the School, as it does in undergraduate
adheres to the educational philosophy of increasing the knowledge and
standing of the individual student by concentration on principles an
application rather than by encyclopedic coverage of techniques and spe
detail. Each program is individually planned according to the student's
ration and needs.

Graduate study may be undertaken in any field of engineering or
science in which the School has adequate facilities and resources. Up
proval, the student may select courses in other departments of instruc
the University to serve specific needs or objectives. A complete list of av
fields and areas of concentration is included under each departmental lis
the "Programs of Study and Courses of Instruction" section of this ca
beginning on page 49.

THE MASTER'S PROGRAMS

The student's program may provide for broad coverage in a variety of
or may be designed to provide a concentration in particular areas. The
mum program consists of 24 semester hours of approved graduate course
a Master's thesis (equivalent to 6 semester hours). With the approval
department the student may elect an optional program without a thesis
consists of a minimum of 33 semester hours of approved graduate courses
Master's candidates are required to pass a Master's Comprehensive Exa
tion. Students whose undergraduate study does not include necessary pre
sites may be required to take more than the minimum semester hours req

Upon admission the student is assigned an adviser. Programs of stud
determined by any prerequisites established and the requirements of the de
ment in which the student wishes to study. The program of studies in pre
tion for the Master's Comprehensive Examination must be approved by
student's adviser and the appropriate department chairman.

Admission

Admission to graduate study toward a Master's degree requires an appro
Bachelor's degree from a recognized institution and evidence of capacity

productive work in the field selected, as indicated by undergraduate grades, Graduate Record Examination scores, and similar data.

An applicant who has significant deficiencies in preparation may be required to take prescribed undergraduate courses as an unclassified student before being admitted to graduate student status. In some cases, if such deficiencies are minimal, he may be admitted to graduate student status and allowed to take a limited number of graduate courses while completing the undergraduate courses in which he is deficient. In no case may the undergraduate courses thus taken fulfill any part of the requirements for the Master's degree.

For additional admissions requirements for the degrees of Master of Engineering Administration and Master of Science in the Department of Engineering Administration, see pages 149 and 152; for the degree of Master of Science in the Department of Operations Research, see page 164. Candidates for the degree of Master of Science in the Department of Electrical Engineering and Computer Science must have satisfied specific undergraduate requirements, depending upon the area of concentration. Students should consult the special brochure *The Graduate Programs of the Department of Electrical Engineering and Computer Science.*

ADMISSION PROCEDURE

Forms for application for admission are available at the School of Engineering and Applied Science. They must be submitted, together with the nonrefundable application fee of $25, to the Manager of Engineering Admissions, Room 100, Tompkins Hall of Engineering, George Washington University, Washington, D.C. 20052, no later than August 1 for the fall semester, December 15 for the spring semester, May 1 for the first summer session, and June 1 for the second summer session. The applicant must request each educational institution attended since high school graduation to send an official transcript of his record directly to the Manager of Engineering Admissions. Although not required, if the applicant has completed the Graduate Record Examination, he should request that his scores be sent to the School. The applicant will be notified by mail when a decision on his admission has been made. English language requirements for foreign students are contained on page 15.

All inquiries and correspondence relative to graduate admission should be directed to the Manager of Engineering Admissions.

TRANSFER CREDIT

Up to 6 semester hours of satisfactory credit (with grades of *A* or *B*), which normally must have been earned in a graduate program at another recognized institution, *may* be accepted in transfer, when applicable, to satisfy Master's degree requirements in this School. However, the student must, with the approval of his adviser, petition to the appropriate department chairman for such transfer.

Registration

A graduate student may register for classes when he presents an official letter of admission or his Registration Card from the previous semester. No registration is accepted for less than a semester or one summer session.

Concurrent registration in this School and in another institution m
ber of the Consortium of Universities of the Washington Metropol
Inc., or another division of this University requires the written per
the Deans concerned, *prior to registration*. Allowance of credit for
concurrently at another institution is at the discretion of the Dean.

Dates and hours of registration are stated in the Calendar, page
the *Schedule of Classes* published in advance of each semester.

Master's Thesis

In those programs requiring a thesis, the degree candidate must subm
ceptable thesis to demonstrate his ability to make independent use of t
edge and discipline of thought acquired and developed by graduate
furnish objective evidence of constructive power in a given field, and
onstrate that he can communicate the results of his work in writing. W
suitable character for which the student has professional responsibility
considered, whether done on or off campus, provided no significant a
work is completed without faculty supervision.

As a part of registration for the thesis course 299, the candidate mus
to the appropriate department chairman (on the form obtainable at th
office) his thesis area, approved by his faculty adviser. He must su
thesis title to the Dean, on the form available in the School office
beginning of the semester in which he expects to graduate. Registr
thesis 299–300 entitles the student, during such registration, to the a
the member of the faculty under whom the thesis is to be written.
consult his adviser, but the thesis is the exclusive responsibility of the

The thesis in final form must be submitted to the appropriate dep
chairman by the date stated in the calendar for the semester in which
didate enrolls in thesis 300. In case a thesis is unfinished on the date sp
the student will be granted an additional semester and must pay the "C
ous Registration" fee (see page 177) unless he is registered for course w
the preparation of the thesis extends beyond the three semesters, appro
an extension of time will be required and the student must reregister fo
300 and pay tuition as for a repeated course. The over-all time limit fo
ing the degree (see page 28) may not be exceeded.

A thesis may be submitted in final form one time. The acceptability
thesis is determined exclusively by the Master's Comprehensive Exam
committee. If the thesis is unacceptable, the student's graduate status
minated.

Printed copies of detailed regulations regarding the form and reproduc
the thesis are available in the Office of the School. Accepted theses, w
companying drawings, become the property of the University and are dep
in the University Library, where the duplicate copies are bound and
available for circulation.

Optional Master's Program Without a Thesis

With the approval of the department, a student may elect an optional pro
without a thesis which consists of a minimum of 33 semester hours of app
graduate courses.

Master's Comprehensive Examination

The student must pass a Master's Comprehensive Examination, to demonstrate substantial understanding of principles and methods and their use in the area of his interest. This Examination may be written, oral, or both. A graduate student who fails any portion of the Master's Comprehensive Examination on his first attempt may be examined one more time if approval is given by the appropriate Examining Committee. In the event of failure to complete the Examination satisfactorily, the student's graduate status terminates.

Regulations

Regulations regarding REGISTRATION, FEES, AND FINANCES *are stated on pages 176–180, other University regulations, on pages 185–189.*

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered. A student is expected to attend every meeting of the course in which he is registered, fully prepared to carry on the work required. A student may be dropped from any course for undue absence. Excused absences must be arranged with the instructor.

SCHOLARSHIP

Grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; and *CR*, Credit for satisfactory thesis completion. Whenever a grade is not assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) is recorded.

Pass-Fail Grading System.—All SEAS students who have a keen desire to advance their knowledge may take SEAS courses under the pass-fail grading system on the basis that the courses cannot be used toward any degree program at SEAS.

At the option of the instructor, the grade of *I* may be recorded if a student, for reasons beyond his control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons before the date when grades must be reported. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, he may initiate an appropriate grade change. Although the grade of *I* may remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An incomplete which is not removed within one calendar year is automatically changed to an *F*.

A student may not repeat for credit a course in which he has received a

grade of *C* or above, unless required to do so by the department con
A written statement requiring the student to repeat such a course fo
must be submitted to the Registrar by the appropriate department ch

Non-thesis Option.—A student may graduate with either:

1. 33 course credit hours of *B* or better with no more than two grade
B of which only one *F* is permitted; or
2. A 3.00 Quality Point Index with a minimum of 33 course credi
with no more than two grades below *B* of which only one *F* is permitte

Thesis Option.—In addition to 6 credit hours of acceptable thesis, a
may graduate with either:

1. 24 course credit hours of *B* or better with no more than two grade
B of which only one *F* is permitted; or
2. A 3.00 Quality Point Index with a minimum of 24 course credi
with no more than two grades below *B* of which only one *F* is permitted.

Quality-point Index.—Scholastic standing is computed in terms
quality-point index obtained by dividing the number of quality points
number of semester hours for which the student registered.

Quality points are computed from grades as follows: *A*, four poi
three points; *C*, two points; *F*, no points, for each semester hour for whi
student registered. Courses marked *W* or *I* are not considered in dete
the index, except that courses marked *I* will be considered when a forma
is recorded. Grades in courses at another institution are not considered in
puting the quality-point index.

RESIDENCE

In general, a minimum of one year of full-time study, or the equivalent in
time study, must be completed in the School.

TIME TO COMPLETE MASTER'S DEGREE REQUIREMENTS

A full-time student in the Master's program is allowed a maximum of
calendar years to complete all degree requirements, from the date of his
graduate-student status registration in prerequisite or graduate courses
part-time student in the Master's program is allowed a maximum of five
endar years. The time limit does not include any period of registration a
unclassified student before admission to graduate student status, nor does
encompass any specified period spent on approved leave of absence. Re
mission is required upon expiration of leave of absence under the conditi
and requirements then prevailing.

Students who do not complete degree requirements within the allowed
have their graduate status terminated. They may be readmitted to gradu
status under conditions specified by the department chairman and approve
the Dean.

PROFESSIONAL DEGREE PROGRAM

The School of Engineering and Applied Science has established the Professi
Degree Program to provide an educational program for those students who
interested in pursuing course work beyond the master's degree, with emph
on applied subject material rather than on basic research.

Successful completion of the Professional Degree program leads to the degree of Engineer or degree of Applied Scientist.

In the Professional Degree program, the School adheres to the educational philosophy of increasing the knowledge and understanding of the individual by concentration on principles and their application. This approach should provide the students with a technical flexibility to enable them to adapt successfully to rapidly changing technology. Each program is individually planned according to the student's background and needs and is subject to departmental requirements.

The Professional Degree program has been designed to satisfy the needs of industry and government for highly trained and educated technical personnel in the areas of engineering and applied science.

Professional Degree Study Programs

The Professional Degree program provides graduate study in those fields of engineering or applied science in which the School has adequate facilities and resources. Upon approval, the student may select courses in other departments of instruction in the University to serve specific needs or objectives.

The student's program may provide for broad coverage in a variety of fields or may be designed to provide a concentration in particular areas. The minimum program consists of 30 semester hours of approved graduate courses beyond a master's degree. Students whose graduate study does not include necessary prerequisites may be required to take more than the minimum semester hours required.

Admission

Admission to graduate study toward the Professional degree requires an appropriate master's degree from a recognized institution and evidence of capacity for productive work in the field selected as indicated by prior scholarship and, where appropriate, professional experience.

REQUIREMENTS

1. *Degree of Engineer.*—To study toward the Degree of Engineer, an applicant must possess a master's degree and a bachelor's degree in the area of engineering.

2. *Degree of Applied Scientist.*—To study toward the Degree of Applied Scientist, an applicant must possess a bachelor's degree in either engineering, mathematics, natural science; and a master's degree in either engineering, natural science, mathematics or administration. Applicants having an equivalent quantitative background could be considered as special cases by the respective departments.

Normally, a *B* average in graduate work is required. However, the minimum does not assure automatic acceptance; the departments may, and often do, set higher admission standards.

ADMISSION PROCEDURE

Forms for application for admission are available at the School of Engineering

and Applied Science. They must be submitted, together with the nonrefu application fee of $25, to the Manager of Engineering Admissions, Roo Tompkins Hall of Engineering, George Washington University, Wash D.C. 20052, no later than August 15 for the fall semester, December 1 spring semester, May 1 for the first summer session, and June 1 for the summer session. The applicant must request each educational institu tended since high school graduation to send an official transcript of his directly to the Manager of Engineering Admissions. The applicant will fied by mail when a decision on his admission has been made.

All inquiries and correspondence relative to graduate admission sho directed to the Manager of Engineering Admissions.

TRANSFER CREDIT

Up to 6 semester hours of satisfactory credit (with grades of *A* or *B*) be Master's program, which must be earned within five years of the start of toward the Professional degree may be accepted in transfer when applica satisfy Professional degree requirements in this School. However, the must, with the approval of the adviser, petition to the appropriate depart chairman for such a transfer.

Program of Study

Upon admission the student is assigned an adviser. Programs are determin established prerequisites and the requirements of the department in whic student wishes to study. The program of studies for each candidate for Professional degree must be approved by the student's adviser and the ap priate department chairman.

An applicant who has significant deficiencies in preparation may be req to take prescribed undergraduate and graduate courses before being admitt Professional degree candidate status. In no case may these courses thus pr fulfill any part of the requirements for the Professional degree.

Each individual department may require the degree candidate to unde and defend the results of a technical design project, development problem the preparation of a comprehensive technical report to demonstrate the can date's ability to make independent use of the knowledge and discipline thought acquired and developed by graduate study. When applicable, the dent will be informed of this requirement by the faculty adviser at the time student's program is being formulated.

In no case, however, will this project be more than 6 credit hours out minimum of 30 credit hours.

Scholarship

No student studying for the Professional degree may receive more than course grades below *B*. If more than two course grades below *B* are rece study is terminated and further enrollment is prohibited. A student must achi a final quality-point average of 3.00 to receive the degree.

Time to Complete Professional Degree Requirements

A full-time student in the Professional degree program is allowed a maxim

of three calendar years to complete all degree requirements, from the date of the first graduate-student status registration in prerequisite or graduate courses. A part-time student in this program is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to graduate student status, nor does it encompass any specified period spent on approved leave of absence. Readmission is required upon expiration of leave of absence under the conditions and requirements then prevailing.

Students who do not complete degree requirements within the allowed time have their graduate status terminated. They may be readmitted to graduate status under conditions specified by the department chairman.

Interrelationship with the Doctoral Program

Candidates for the D.Sc. degree or Professional degree who are in good academic standing, may, with the approval of the faculty adviser and department chairman, transfer from one degree program to the other, if they meet necessary qualifications and requirements as specified by the appropriate department.

Residence and Continuous Study

All work for the degree must be done in residence (on the campus) except when special permission is granted by the chairman of the department. The student must maintain continuous registration in the School. Failure to do so breaks the student's registration and he must apply for readmission to the Professional degree program under whatever conditions and regulations are in effect at that time.

THE DOCTORAL PROGRAM

The School of Engineering and Applied Science offers a program of advanced study and research leading to the degree of Doctor of Science. This program is limited to those fields in engineering or applied science in which a discipline has been established and for which the University has or can arrange adequate resources.

The doctoral program is designed to prepare the student for a career of creative scholarship by providing a broad but balanced background of knowledge and guidance in the performance of research. It requires study of interrelated fields of learning as well as original research in the field of central interest.

The program for the degree is divided into two stages. The first—made up of a study of interrelated fields of learning which supports the general area of research concentration—culminates in the qualifying examination. The second —composed of research investigation of a particular subject in a special field and the presentation of such research findings in a written dissertation—culminates in the final examination.

Admission to Doctoral Study

A satisfactory Master's degree from an accredited institution is required, together with acceptable personal qualities and a capacity for creative scholarship. Normally, a *B* average in graduate work is required. However, the mini-

mum does not assure automatic acceptance; the departments may, and oft set higher admission standards.

APPLICATION FOR ADMISSION

Forms for application for admission are available at the School of Engi and Applied Science. They must be submitted, together with a nonrefu application fee of $25, to the Manager of Engineering Admissions, Roo Tompkins Hall of Engineering, George Washington University, Wash D.C. 20052. The prospective doctoral student seeking admission should before June 1 for the fall semester and before December 1 for the s semester. Personal interviews may then be arranged to discuss the appl qualifications and the possibilities for an effective doctoral program. The cant must arrange for complete documentary records (transcripts) to be warded to the Manager of Engineering Admissions in sufficient time to p assembly of complete records for evaluation as soon after the above applic deadlines as possible.

The applicant must arrange for letters of recommendation to be subm from two faculty members of the institution from which he received his ter's degree; one of these, if possible, should be from his Master's adviser letters should be addressed to the appropriate department chairman.

Language Requirement

A doctoral student should maintain a broad outlook as he pursues his st and therefore must have the capability of reading appropriate literature lished in a foreign language. Accordingly, a reading knowledge of one for language, preferably Russian, must be demonstrated before admission to qualifying examination. If the student wishes to satisfy this requirement wi language other than Russian, he must obtain the approval first of his doct adviser, then of his department chairman; permission to use a language than Russian will be granted on the basis of its importance to the stud field of interest.

Tool Requirement

In addition to the language requirement, an examination in a tool requirem (e.g., computer programming) may be established by the various departme

Study for the Qualifying Examination

Upon admission to the first stage of the program, i.e., study of interre fields culminating in the qualifying examination, the student is assigned a f ulty adviser who directs his studies.* The adviser approves appropriate be of study to insure the student's breadth of knowledge and to support resea in his central field of interest, advises him concerning the scope and conten his fields of study, and guides him in preparing for the qualifying examina Programs of study are normally structured to include a major field of study two minor or supporting fields.

* In some departments, instead of a faculty adviser, a faculty committee may be appoi approve programs, direct study, and carry out all other responsibilities of the faculty adviser.

A minimum of 30 semester hours of credit in a formal program at the graduate level beyond Master's study is required. In many cases, particularly in those in which the student undertakes a doctoral program in a field other than that in which he obtained his Master's Degree, the program of studies exceeds 30 semester hours.

Students admitted to doctoral study are encouraged to undertake one year of full-time study on campus. In general, the adviser will require the student to register for a minimum of 6 semester hours of course work in every semester except the summer sessions.

Transfer of Credit

Up to 6 semester hours of credit earned in courses completed with the grade of *A* or *B* while enrolled in a doctoral program at another accredited institution may be accepted in transfer to satisfy doctoral requirements of this School, subject to the approval of the student's adviser and his department chairman. Credit earned in courses completed more than five years prior to admission to the doctoral program will not be accepted in transfer, and some departments may require that transfer credit must have been earned within a shorter period of time before admission.

The Qualifying Examination*

The purpose of the qualifying examination is to ascertain that the student's background and intellectual development are adequate to support doctoral research in his central field. Qualifying examinations may be written or oral, or both, and are scheduled over a period of several days. They are conducted only during the fall and spring semesters on dates established by the departments and are administered by a faculty committee. Upon favorable report of the examiners to the Dean through the appropriate department chairman, the student is admitted to candidacy for the degree; he then begins his specialized study and research under the supervision of a designated member of the faculty or, in special instances, an outstanding engineer/scientist who is not a member of the faculty.

The qualifying examination is the principal means used to determine the student's ability to qualify as a candidate for the doctoral degree and to enter the second stage of his program.

At the discretion of the committee which prepared the examination, the doctoral student may be given a second opportunity to qualify for candidacy in the event of failure in any part of the qualifying examination. In general, the entire qualifying examination must be retaken by the student in order to qualify for candidacy.

Scholarship

To be admitted to the qualifying examination, the doctoral student must achieve an over-all academic average of 3.20 on a scale of 4 (a grade of *A* equals 4 points; *B*, 3 points; *C*, 2 points; and *F*, 0 points). No doctoral student may receive more than two course grades below *B*. If he does receive more than two

* Some departments may administer a pre-qualifying examination prior to completion of the study program.

course grades below *B*, his graduate study is terminated and his further en
ment prohibited. Courses in which the student earns grades below *B* are
included in his total semester-hour requirement for the degree. In the ev
student receives any grade below *B*, he is required to consult with his ad
for a review of his program of study and discussion of possible changes the

Research, Dissertation, Final Examination

The student admitted to candidacy for the degree of Doctor of Science requ
as Director of Research the member of the faculty under whom he wishes
conduct his research. The faculty member may accept or reject such requ
The research area is approved by the Director. Throughout the remainder
the doctoral program the candidate works directly under his Director in his
sertation research. However, the student is not precluded from consulting
other members of the faculty, as may be required, on an informal basis.
may be encouraged to do so by his Director of Research. A committee of
faculty consisting of three members including the Director as chairman
advise in the final preparation of the dissertation. The department chair
appoints such a committee on the recommendation of the Director of Resea
Work on the dissertation is equivalent to a minimum of 24 semester hours.

THE DISSERTATION

A dissertation is required as evidence of ability to perform original schol
research and to present and interpret the results. The student is solely resp
sible for the content of his dissertation.

The aim of the student in this stage of his candidacy is the production
dissertation which embodies the results of an extended study original in na
and which includes material deemed worthy of publication in recognized sc
tific and engineering journals. The student is expected to attempt to publish
results of his research as soon as possible after he receives his degree and
submit copies of the published material to the Dean. Credit must be given
the publication to the fact that the material is abstracted, summarized, de
oped, etc., from a dissertation submitted to George Washington University
partial fulfillment of the requirements for the Doctor of Science degree.

The candidate must submit to the appropriate department five complete
ies of the dissertation and two original copies of an abstract (not to exceed
words) of his dissertation no later than the date specified in the calendar
copy of the abstract is for inclusion in the announcement of the examina
and one for reproduction by University Microfilms, Inc. One copy of the
sertation is also sent to University Microfilms, Inc.

Printed copies of detailed regulations regarding the form and reproduc
of the dissertation, preparation of the abstract, and services offered by Uni
sity Microfilms, Inc., are available at the School Office. The successful ca
date for the doctorate is required, before receiving his degree, to pay a fee
cover a part of the expense of printing the abstract of his dissertation, and
the basic service rendered by University Microfilms, Inc. Accepted disse
tions, with accompanying drawings, become the property of the University
are deposited in the University Library where bound copies are available
circulation.

THE FINAL EXAMINATION

Upon acceptance of the dissertation by the committee, consisting of the Director and two other faculty members of this School, which has assisted in supervising its final preparation, the candidate is presented for his final examination. The final examination is oral and is open to the public. The candidate must demonstrate a mastery of his special fields of study and of the materials and techniques used in the research. The committee of examiners will consist of not less than five members, three of whom must be members of the faculty on full-time service. The committee may include qualified experts brought to the University especially to participate in the examination. The Director of Research serves as Advocate for the candidate. When the candidate satisfies the examining committee of the high quality and originality of his contribution to knowledge as well as his mastery of the scholarship and research techniques of his field, the committee of examiners recommends him for the degree of Doctor of Science. The final examination is conducted only during the fall and spring semesters. The candidate should consult with the appropriate department chairman as to possible dates for the examination.

Residence and Continuous Study

All the work for the degree must be done in residence (on the campus), except when special permission is granted by the chairman of the department. The student must maintain continuous registration in the School. Failure to do so breaks the student's registration, and he must apply for readmission to doctoral study under whatever conditions and regulations are in effect at that time. In case of incapacity or other legitimate reasons, the student may be granted a leave of absence of up to one year. Extension of such leave will require special request to and approval of the appropriate department chairman. During approved leave of absence, the student must maintain continuous registration. The time period for completion of all requirements for the degree will be adjusted on the basis of the approved leave of absence.

In general, one year of study is the minimum amount of time to be spent in preparation for the qualifying examination. The qualifying examination must be completed within five years of the date of admission, and the entire degree program must be completed within seven years. After admission the student may apply for his qualifying examination whenever he believes that he is properly prepared. A minimum of two years of full-time study and research should be expected in meeting the requirements for the degree.

Special Programs

INSTITUTE FOR THE STUDY OF FATIGUE, FRACTURE, AND STRUCTURAL RELIABILITY

The basic objective of the Institute for the Study of Fatigue, Fracture, and Structural Reliability of the School of Engineering and Applied Science is to develop an interdisciplinary approach to fatigue research through close cooperation of research workers from different fields. The Institute deals principally

with the study of the physical mechanism of damage initiation, in ord establish principles for the rational design of metal alloys of superior fa performance on the one hand, and to develop advanced methods of fa design and reliability on the other. Because of the large volume, past and rent, of straight fatigue testing of standard test specimens in industrial, go ment, and university laboratories, no testing of this type is generally cond by the Institute. However, results of such tests appearing in publication reports are carefully scrutinized for their significance in terms of the purp of the Institute. In addition to advancing interdisciplinary research, the I tute provides specialized training for graduate students.

The Institute conducts seminars, issues technical reports, and supplies i mation, lectures, and consultations to many government and industrial rese and development laboratories.

INSTITUTE FOR MANAGEMENT SCIENCE AND ENGINEERING

The Institute for Management Science and Engineering defines and deve new management techniques required to keep pace with an ever-expan technology. It provides a multidisciplinary environment for innovative gr ate teaching and substantial opportunities for research activities and pu service under diversified sources of external support. The principal acade fields directly involved are operations research, management science, and computer sciences.

The programs of the Institute are concerned with important educational public-service needs for conservation of national resources. Such progr require full-time interaction among students, faculty, and staff in ways sible only at universities. Through its Program in Logistics, the Institute forms research leading to the development of a science of logistics featu principles and methodology for resource allocation problems in civil affairs national defense efforts.

Participation by faculty members and graduate students from all sch in the University is encouraged as consistent with the multidisciplinary jectives of the Institute. Graduate students are supported through resea assistantships with thesis and dissertation efforts ordinarily being the re work responsibilities. Reliance is also placed on staff research specialists. there are special provisions for substantial contributions from distinguished tors from government, private industry, and other universities.

The Institute disseminates its results through seminars, colloquia, conferen and a special series of monographs. All research is unclassified.

THE GWU—NASA-LANGLEY GRADUATE PROGRAM

George Washington University, in cooperation with the National Aeronau and Space Administration's Langley Research Center, has a full-resident gr uate engineering program at NASA-Langley, in Hampton, Va., approximat 200 miles south of Washington, D.C.

The program is open to qualified NASA employees and area resid Courses may also be taken by nondegree students, with the approval of

instructor. Students may be permitted to transfer a maximum of 6 semester hours of approved graduate course credit from other accredited institutions.

Courses in the program are taught by NASA scientists and engineers and the faculty of the School of Engineering and Applied Science. NASA-Langley's extensive scientific and engineering facilities and equipment are utilized whenever feasible.

The program at NASA-Langley leads to the degrees of Master of Science, the professional degree of Engineer, and Doctor of Science (by special permission of the appropriate department chairman) in the fields of acoustics, environmental modeling (M.S. degree only), flight sciences, fluid mechanics and thermal sciences, solid mechanics and materials engineering, structures and dynamics, and electrical engineering and computer science.

Information regarding this program may be obtained from John L. Whitesides, Jr., Coordinator, GWU-NASA Program, Mail Stop 69, NASA-Langley Research Center, Hampton, Va. 23365.

The GWU—NASA-Langley Joint Institute for Acoustics and Flight Sciences (JIAFS)

The National Aeronautics and Space Administration's Langley Research Center joined with George Washington University's School of Engineering and Applied Science in 1971 to create the Joint Institute for Acoustics and Flight Sciences.



This jointly operated Institute is dedicated to increasing the nation's r and engineering capabilities in relevant technical fields such as ac flight sciences, and structures and dynamics. The Institute, which is at the Langley Research Center, is dedicated to the advanced training dents and professional engineers in acoustics, flight sciences, structures namics, environmental modeling, and materials science and other relevan and serves to provide a center for advanced research by bringing toge searchers and scholars from these fields for the exchange of ideas and fi It is also the purpose of the Institute to provide the necessary facilities for fied researchers and scholars who want to engage in research work i areas.

The organization of the Institute consists of a director, John E. Dube sociate Director of the NASA-Langley Research Center, and a co-di Harold Liebowitz, Dean of the George Washington University's Sch Engineering and Applied Science.

The objective of the program is to prepare qualified graduate stude careers in research, development, design, and teaching to meet the challe ever-increasing technical problems and the nation's needs in these fields education and research opportunities offered in the program combi academic resources of George Washington University and the profe research resources and facilities of NASA-Langley Research Center. opportunities also enable students to involve themselves in research p that excite their interest and permit them to associate with prominent members who are working on related problems. Most of the faculty NASA scientists conduct research, and students are closely knit into th mate association of research and instruction from the day of their arri is believed that the experience of the students during their stay at N Langley Research Center will be highly rewarding and will benefit throughout their future careers.

The current education and research programs are the following:

Acoustics Program.—The Acoustics program is concerned with the lems of alleviating noise and with providing a technical base for desi acceptable aircraft and space vehicles, noise-resistant structures, and g transportation systems. Areas of current research interest include boun layer noise, duct acoustics, jet noise, nonlinear problems in acoustics, noise, structural response to noise, mechanical and acoustical coupling lems, and subjective response to noise and vibration.

Flight Sciences Program.—The Flight Sciences program deals with adv flight concepts of both CTOL and V/STOL aircraft, including areas of dynamics, instrumentation, guidance and control, aeroelasticity, and sy analysis. Specific research areas that are currently being investigated in aerodynamic analysis of jet-augmented wings, stability and control of V/S aircraft, analysis and flow visualization of wing-tip vortices, wind-tunnel flight testing of V/STOL aircraft, stall-spin characteristics of aircraft, e mental evaluation of aircraft handling characteristics, and ride-quality c of STOL aircraft.

The Structures and Dynamics Program.—The Structures and Dynamics gram is designed to provide a basic understanding and a working knowled some key areas pertinent to structures, solid mechanics, and dynamics nology including computer-aided design. Areas of current research inter clude solution techniques on fourth-generation computers; multidisciplinary

integrated design procedures; interactive graphics; nonlinear and dynamic problems; rotor dynamics; active control; mathematical programming; and other advanced structural design procedures.

The Environmental Modeling Program.—The Environmental Modeling Program is aimed at developing mathematical models which characterize the atmosphere for use in predicting pollutant distributions and transport, and for use in interpretation of satellite remote measurements of atmospheric constituents. Areas of research include direct and inverse techniques for the radiative transfer problem; effects of particulates on atmospheric chemistry and energy balance; role of chemistry, mass transport, and radiative transport in models of the stratosphere and troposphere.

The Materials Science Program.—The Materials Science Program is concerned with theoretical analysis and experimental verification of processes which degrade mechanical properties of metal-matrix composites; analysis of corrosion and stress-corrosion of materials in environments encountered by aerospace vehicles; analysis of creep and cyclic creep materials, based on both deterministic models and multiparameter regression; and prediction of mechanical properties of engineering alloys in terms of composition, processing conditions, and service history. Areas of current research interest include interfacial effects, stress corrosion, cyclic creep prediction, and mechanical property prediction.

Participating in these programs are Graduate Student Research Scholar Assistants, faculty from George Washington University, scientists and engineers from NASA-Langley, and visiting scientists and engineers.

A number of Research Scholar Assistantships are available to qualified students seeking an outstanding opportunity for graduate study and research leading to the degrees of Master of Science and Doctor of Science in the fields of Acoustics, Flight Sciences, and Structures and Dynamics. Applicants



who are awarded Research Scholar Assistantships will receive stip
up to $7,000 a year for a Master of Science degree and $8,000 a
the Doctor of Science degree. Applications, a JIAFS brochure, and ad
information may be obtained from Professor S.W. Yuan, JIAFS, Schoo
gineering and Applied Science, George Washington University, Was
D.C. 20052.

COOPERATIVE EDUCATION PROGRAM IN ENGINEERING

Cooperative education is a process of education which formally integr
student's academic study with work experience in cooperating employer
zations. The usual plan is for the student to alternate periods of colleg
with periods of experience in appropriate fields of industry and gover
The experience periods are considered an integral part of the student's
tion. Through the interaction of the study and work experiences, the
enhances his academic knowledge, his personal development, and his
sional preparation. The teaching faculty, the coordinators, and the em
supervisors share in the educational process of the cooperative student.

The following factors are adhered to as closely as possible for the st
working experience:

1. The student's employment is related as closely as possible to his
study and individual interest within his field.
2. The employment is considered to be a regular, continuing, and e
element in the educational process.
3. The working experience will ideally increase in difficulty and re
bility as the student progresses through the academic curriculum. Norma
salary of the student will increase accordingly.

The student's working experience in industry or government gives hi
opportunity to meet and work with men and women under varied cond
to get along with them, learn from them, respect them, and earn their r
Indeed, these advantages alone could be as important in shaping a youn
son's life as the opportunity to obtain experience in a chosen field.

Advantages of Cooperative Education

Combines Theory and Practice.—By coordinating the work experi
industrial and governmental organizations with the campus education pro
theory and practice are closely integrated, and students find greater rele
in their studies. As a result of this alternation between academic and ind
environments, the student tends to understand the role and meaning of
environment, with a deeper appreciation for each.

Helps Finance Educational and Living Expenses.—The student's earning
contribute substantially to financing his own education and living expenses.
ing to independence and contributing significantly to his self-esteem and
fidence. As stated earlier, it is expected that as the working experienc
creases in difficulty and responsibility as the student progresses through
academic curriculum, the salary of the student will increase accordingly

Serves as a Bridge to the Future.—Cooperative education helps marked
orient students to the world of work. Most students are genuinely concer
about their future life work. They want to know more about the range of
pations open to them, and the potentials and limitations of these fields.

want to know about the qualifications demanded and their own fitness. Through cooperative education programs, students have opportunities for exploring their own abilities in connection with real jobs, and they find a direct means of gaining information and guidance not only in the occupations in which they are employed but in a number of related fields as well. They have a chance to test their own aptitudes more fully than is normally possible on campus.

Increases Motivation to Achieve.—This coordination of work and study increases student motivation. As students see connections between jobs they hold and the things they are learning in school, greater interest in academic work develops. During the work periods there is a tendency for the student to develop good work habits because his efforts as a productive and salaried employee are rated by the employer.

Enhances Human Relationships.—Because the work experiences involve the students in relations with co-workers who come from a variety of backgrounds, and because success in these jobs requires constructive relationships with colleagues, most students in cooperative education develop deeper understanding of other people and greater skills in human relations.

Augments Development of Maturity.—For many students the work experience contributes to an increased sense of responsibility for their own efforts, more dependence on their own judgments, and a corresponding development of maturity. In addition, the student's role as a team member in a real and productive working environment inculcates a seriousness of life and purpose which is often delayed for the traditional college graduate.

Responsibilities of the Cooperative Student

As a cooperative student working in association with the professionals in his field, the student must adopt professional standards of conduct. He is also a representative of the George Washington University School of Engineering and Applied Science. After each work period the student prepares a report describing his duties and responsibilities at work, and his supervisor sends an appraisal of his work performance to the Cooperative Program Coordinator. These reports are reviewed with the student.

The cooperative program is a three-way partnership among the student, his employer, and George Washington University. The student's responsibilities extend equally to each of the other two members of the partnership, and the partnership cannot be altered during the program without the knowledge and consent of all.

Why Employers Participate in Cooperative Education Programs

Industry and government agencies have found that cooperative students are valuable employees. Generally speaking, they are alert and energetic young people who, stimulated by a definite goal, return more than a day's work for a day's pay. Graduates of the cooperative program represent a good source of well-trained manpower. The training period provides an opportunity for the employer to evaluate the student as a prospective permanent employee. Employers feel that this program is an important part of their effort to attract well-qualified employees. At the same time, the student is able to evaluate the employer in terms of his future plans and interests. About half of the cooperative graduates establish such mutually beneficial relationships with their employers

that they remain in permanent employment after graduation, with a s
head start in their careers.

It is emphasized, however, that neither the student nor the employ
ligated for permanent employment after graduation. Industry and go
agencies consider participation in cooperative education as a long-rang
ment rather than a current expense. As a partner with the University,
ployer is engaged in a joint effort to develop young talent more fully,
suring better education for the student, improved utilization of the f
and greater cooperation with the University.

Scholastic Requirements

Students entering the program must be in good academic standing a
have completed at least two semesters of academic study prior to their f
time work assignment. To remain in the program, the student must ma
passing average and perform satisfactorily for his employer.

Living Accommodations

Arrangements will be made for students in the cooperative program t
their dormitory and dining privileges at the University, if they so desire,
the work periods. During this time, they will also retain full student pr
and have access to all University facilities. Faculty will be available f
sultation by appointment.

Work-Study Schedules

At this time, individual schedules are being arranged with the various e
ers in the Washington area. Since each employer operates differently,
schedules are arranged which are mutually satisfactory to the student, t
ployer, and the School.

Generally, the student's schedule is arranged with the employer after
successfully completed the first year of study. Many employers will requ
student to work during the summer immediately following the freshman
The student returns to the School for the sophomore year, working agai
ing the second summer. Beginning with the third year, students alterna
tween employer and classroom each semester for the next two years, ret
to the classroom for the fifth and final year. An alternate method is to w
full academic year and then return to school. Schedules for transfer st
are arranged on an individual basis according to the number of credit
transferred and the employer's requirements.

Arrangements have been made or are in progress with many businesses,
trial organizations, and governmental agencies for employment opportuni

COOPERATIVE PROGRAM WITH NAVY LABORATORIES

Arrangements have been made with the U.S. Naval Ship Research and D
opment Centers, Annapolis and Carderock, Md., and with other naval
oratories in which it is possible for the student to earn a substantial portio
his or her educational expenses on planned technical work assignments, ob
Bachelor of Science degree in such areas as civil, electrical, or mechanic

gineering, and be in a preferred position upon graduation to obtain a permanent Civil Service position with a grade and salary commensurate with the student's education and experience.

To participate in the program at the naval laboratories, the student must be academically acceptable to the University and must meet the requirements of the Civil Service Commission for employment at these laboratories.

Tuition Aid

Under the Tuition Aid Program offered by the Navy, tuition, textbooks, and fees (exclusive of room and board) up to 50 per cent may be granted on request. If tuition assistance is received, the cooperative student must agree to serve as a government civilian employee after graduation for a period to be determined by regulations in effect at that time.

Work Experience

This program integrates formal study at this School with practical work experience, an essential element of the educational process. The employment is related to the field of study in which the student is engaged, and it is diversified to afford breadth of experience. The work experience increases in difficulty and responsibility and, in general, parallels the student's progress through the academic phases of his program.

As a Civil Service employee, the co-op student is eligible for many federal benefits, including annual leave, sick leave, paid holidays, health benefits, and life insurance.

Freshman Admission

Applications for the cooperative education program should be submitted before March 1 of the senior high school year. Students graduating at mid-term and wishing to begin study in the spring semester should apply no later than December 1.

Transfer Student Admission

Transfer students from other institutions should submit cooperative education applications and required credentials prior to June 1 for the fall semester, December 1 for the spring semester, and May 1 for the summer sessions. The transfer student should be in good standing as to scholarship and conduct. He should be eligible to return to the last previously attended institution in the semester for which he seeks admission to this University.

UNDERGRADUATE DUAL-DEGREE PROGRAMS WITH HAMPTON INSTITUTE AND BOWIE STATE COLLEGE

The School of Engineering and Applied Science, Hampton Institute, and Bowie State College, all of which are accredited four-year degree-granting institutions, have established a 3–2 dual-degree program that joins general education and career education in a unique and comprehensive experience. This program is

in addition to the engineering programs already offered on the cam
George Washington University.

Hampton and Bowie State offer several four-year degree programs in a v
of disciplines. To provide opportunity for careers in engineering, Hampto
stitute and Bowie State joined with the School of Engineering and Ap
Science, which offers accredited four-year programs in engineering.

Students enrolled in the 3–2 program at Hampton or Bowie State first f
a general program of study for three years at Hampton Institute or B
State. This program is based on the social sciences, humanities, and the
paratory background engineering courses in mathematics, physics, and chem
which help develop broad cultural perspectives, analytic abilities, and comm
cation skills.

After successful completion of the first phase of study, students then f
a two-year career program in engineering at the School of Engineering
Applied Science. During this phase of the study, students may specializ
any of the following areas of engineering, which are also offered in GWU's
ular four-year programs:

1. Civil Engineering, or the following options: Environmental-oriented
Engineering, Computer-oriented Civil Engineering, Geotechnical Civil E
neering.

2. Electrical Engineering, or the following options: Computer Science,
medical Engineering.

3. Mechanical Engineering, or the following options: Energy Resources
Power, Computer-oriented Mechanical Engineering.

Some of the advantages of the dual degree program follow.

Minority students may begin their education at Hampton Institute or B
State and a B.S. in an engineering area from George Washington Univers
This unique academic background provides the student with many option
choosing a profession upon graduation. The student may go into engineer
practice, continue study for advanced degrees, or enter other professional a
such as law, medicine, or teaching.

Minority students may begin their education at Hampton Institute, or B
State, which are predominantly black colleges, and then complete the last
years of their education at an urban university in Washington, D.C., the
widening their educational, social, and cultural backgrounds.

Dual-degree students, while at Hampton, may participate in the Summ
Training Program. In this program, students may work for a 12-week per
during the summer at the Joint Institute for Acoustics and Flight Sciences
the National Aeronautics and Space Administration's (NASA) Langley R
search Center in Hampton, Va., obtaining valuable work experience in a
rate laboratory while earning funds for the following academic year. This
gram may be made available to some prefreshmen who desire to work
graduation from secondary school.

Dual-degree students at Bowie State may avail themselves of summer
ployment through the GWU Cooperative Education Program in Engineer
prior to their actual attendance at George Washington University.

In GWU's Cooperative Education Program in Engineering (see page
a student may work summers and one or two academic semesters and e
sufficient funds to help pay expenses while obtaining valuable engineering
perience.

The 3–2 program offers the student time to acclimate himself to college

and study at a reasonable cost while preparing for an exciting and rewarding profession.

For further information write or call Dean of Admissions and Registrar, Hampton Institute, Hampton, Va. 32668, Phone (804) 727-5328 or 727-5329; or Mr. Johnny W. Ponds, Mathematics Department, Bowie State College, Bowie, Md., 20715, Phone (301) 262-3350; or Manager, Engineering Admissions, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20052, Phone (202) 676-6168.

CONTINUING ENGINEERING EDUCATION PROGRAM

> The future of the engineering profession will depend to a considerable extent on the demonstrated competence of individual engineers to make optimum use of the latest scientific and technical knowledge in dealing with current and future problems. Participation in programs of continuing engineering studies will ensure that such competence can be maintained.*

The School of Engineering and Applied Science is meeting the need expressed above with a comprehensive program of noncredit courses. The objective of the program is to enhance the competence of practicing engineers rather than to aid in their attainment of academic degrees. Tuition for noncredit courses offered in the program is usually paid by the employers, who recognize the necessity for immediate improvement in the employee's on-the-job capability. Staff reorganizations and reductions have required many engineers to change their specialties or to take on additional duties within their present jobs; continuing engineering education can provide the education and skills necessary for these changes. Continuing engineering education also aids in qualifying for promotions, and for maintaining certification in certain professional fields.

The program will present about 200 noncredit courses this year. A number of them last for five days (30 classroom hours), while others last for two, three, or four days. Some courses are presented in the evening (two-hour sessions once a week for 10 to 12 weeks). In some courses, presentation of theory is augmented by workshops to give participants practice in the application of the particular discipline. Students from all over the nation and from many foreign countries have participated in courses. Their variety of experience and background enhances the value of the discussions, enriching their relationships with each other and with their instructors.

Some of the subjects which have been presented in this program include:

Adhesion Principles and Applications
Antennas
Clinical Engineering
Configuration for Software Programs
Configuration Management
Construction Estimating
Construction Management
Cost Analysis for Engineers
Data Base Management
Design to Cost
Digital and Data Communications
Digital Integrated Circuits
Electrical Controls and Protective Relaying
Energy Conservation
Environmental Impact Statements

* American Society for Engineering Education, Final Report: Goals of Engineering Education (Washington, D.C.: January, 1968).

Fault Tree Analysis
Fiber and Integrated Optics
Finite Element Method
Forecasting Techniques
Heat Pipes
Infrared Technology
Intensive and Coronary Care Units
Laser Communications
Lasers
Life Cycle Costing
Management of Research and Development
Metal Fracture and Fatigue
Metric Conversion
Microprocessors
Minicomputers
Monte Carlo Simulation
Municipal Solid Wastes
Nonlinear Programming
Nonparametric Statistics
Operations Research
Program Management
Radar Systems
Reliability
Satellite Communication Syste
Solar House Heating and Cooli
Sonar
Specifications and Standards
Spread Spectrum Communicatio
Standards and Calibration Labs
Statistics for Engineers
Surface Colloid Chemistry
System Safety
Telecommunications
Temperature Control Systems
Warehousing
Writing Technical Communicati

New courses are added as needs become apparent in various fields and repe courses are continuously revised.

In addition to the faculty of the School of Engineering and Applied Sci outstanding lecturers and instructors from other universities, from industry, from government laboratories and agencies serve on the instructional sta the program.

The program also offers noncredit contact courses off-campus specifi tailored for the needs and background of the engineers employed by a comp or agency. Tuition for these courses is usually slightly lower than for t offered at the University. Such courses have been presented as far awa Argentina.

To receive announcements or additional information on the program, w to Continuing Engineering Education Program, School of Engineering Applied Science, George Washington University, Washington, D.C. 2005 call (202) 676-6106.

Administration

Harold Liebowitz, D.Ae.E., *Dean of the School of Engineering and Ap Science; Co-director of the Joint Institute for Acoustics and Flight Scie*
James Elmer Feir, Ph.D., *Assistant Dean of the School of Engineering Applied Science*
William Henry Marlow, Ph.D., *Chairman of the Department of Operations search; Director of the Institute for Management Science and Engineerin*
Arnold Charles Meltzer, D.Sc., *Chairman of the Department of Electrical E neering and Computer Science*
Sam Rothman, Ph.D., *Chairman of the Department of Engineering Admi tration*

Shao Wen Yuan, Ph.D., *Chairman of the Department of Civil, Mechanical, and Environmental Engineering; Associate Director, Joint Institute for Acoustics and Flight Sciences*
John Edward Duberg, Ph.D., *Director of the NASA-Langley Graduate Program; Director of the Joint Institute for Acoustics and Flight Sciences*
Malcolm P. Clark, M.S., *Administrator of the NASA-Langley Graduate Program*
William F. Shanahan, B.S., *Manager of Engineering Admissions and Cooperative Education*
John Lindsey Whitesides, Jr., Ph.D., *Assistant Director, Research and Education, Joint Institute for Acoustics and Flight Sciences*
John Witherspoon, M.S., *Assistant Administrator of the NASA-Langley Graduate Program*
Jack Emerson Mansfield, B.S. in E.E., *Director of the Continuing Engineering Education Program*
Frederic A. Hooper, M.S., *Research and Resources Officer*
George Ellowitz, B.A., *Executive Associate to the Dean*

DEAN'S COUNCIL

Harold Liebowitz *(Chairman)*, R.R. Fox, N. Kyriakopoulos, J.B. Smith

ACADEMIC CONSULTANT

Ernst Weber, Ph.D., *Chairman, Division of Engineering, National Research Council*

Advisory Council*

THE PURPOSES of the Advisory Council for the School of Engineering and Applied Science are to strengthen communication between the School and the other colleges, schools, and divisions of the University as well as between the School and the University's Board of Trustees; to advise on the programs of instruction, research, and service in the School and to help interpret these programs to the community and the nation; and to stimulate support for the continued development of the School and its programs.

MEMBERS OF THE COUNCIL FOR 1976–77

Chairman: Stephen R. Woodzell *(University Trustee), Former President of the Potomac Electric Power Company*
Raymond L. Bisplinghoff, *Chancellor, University of Missouri, Rolla*
Bruno A. Boley, *Dean, Technological Institute, Northwestern University*
George M. Bunker, *President, Martin Marietta Corporation*

* The President of the University, the Vice President for Academic Affairs, and the Dean of the School of Engineering and Applied Science are ex officio members of the Advisory Council.

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ciation of American Railroads
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Corning Fiberglas Corporation
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L.A. Zadeh, *Chairman, Department of Electrical Engineering and Comp*
Sciences, University of California, Berkeley

PROGRAMS OF STUDY AND COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES are listed programs of study, curricula, and courses of instruction offered by the School of Engineering and Applied Science.

Students who are not candidates for degrees but who wish to take courses offered by the School should apply for admission to the Division of University Students.

EXPLANATION OF COURSE NUMBERS

Courses numbered from 1 through 199 are planned for undergraduate credit, although certain courses may be taken for graduate credit when arrangements are approved in advance by the instructor and the Dean. Courses numbered 201 to 300 are planned for graduate credit and may in certain instances be taken by qualified undergraduate students. Courses numbered from 301 to 400 are primarily for doctoral students.

SEMESTER HOURS OF CREDIT

The number of semester hours credit given for the satisfactory completion of a course is indicated in parentheses after the name of the course. Thus, a year course giving three hours of credit each semester is marked (3–3), and a semester course giving three hours credit is marked (3). A semester hour consists of the completion of one 50-minute period of class work or of one laboratory period a week for one semester.

TIME OF COURSE OFFERINGS

Following course descriptions is a parenthetical statement listing the semester for which the course is scheduled to be offered. The term "academic year" is used only with two-semester courses, and indicates that the first half of the course is to be offered in the fall semester and the second half in the spring semester; the term "as arranged" is used for courses which could not be

scheduled at the time of printing this catalogue. Offerings for th sessions are not designated in this catalogue. Students should c *Summer Sessions Schedules of Classes* for summer offerings. A *Sc Classes* is also published for each fall and spring semester which provi date information concerning the time of course offerings.

KEY TO ABBREVIATIONS

The following abbreviations for course designations are used by Geor ington University.

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anes	Anesthesiology
Anth	Anthropology
ApSc	Applied Science
Art	Art
ArTh	Art Therapy
Bioc	Biochemistry
BiSc	Biological Sciences
BAd	Business Administration
Cart	Cartography
Chem	Chemistry
CH&D	Child Health and Development
Chin	Chinese
CE	Civil Engineering
Clas	Classics
ClEn	Clinical Engineering
CSci	Computer Science
Derm	Dermatology
Econ	Economics
Educ	Education
EPol	Education Policy
EE	Electrical Engineering
EAd	Engineering Administration
EFL	English as a Foreign Language
EngS	Engineering Science
Engl	English
EnHe	Environmental Health
Envr	Environmental Studies
Hum	Experimental Humanities
ForS	Forensic Sciences
Fren	French
Gnet	Genetics
Geod	Geodesy
Geog	Geography and Regional Science
Geol	Geology
Geop	Geophysics
Germ	Germanic Languages and Literatures
HCA	Health Care Admi
HCS	Health Care Science
Hist	History
HKLS	Human Kinetics and Leisure Studies
Idis	Interdisciplinary Co
Ital	Italian
Japn	Japanese
Jour	Journalism
LAm	Latin American Stud
Law	Law
LEnf	Law Enforcement
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineeri
M&PA	Medical and Public A
Med	Medicine
Micr	Microbiology
Mus	Music
NSur	Neurological Surgery
Neur	Neurology
Ob&G	Obstetrics and Gynec
Ocea	Oceanography
OR	Operations Research
Opth	Ophthalmology
Orth	Orthopaedic Surgery
Otol	Otolaryngology
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
Phys	Physics
Phyl	Physiology
PSc	Political Science
Port	Portuguese
Pchl	Psychiatry and Behavioral Sciences
Psyc	Psychology
PAd	Public Administration
Rad	Radiology
Rel	Religion
SHum	Service-Learning Expe Humanities

SPSc	Service-Learning Political Science
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
SpEd	Special Education
SPDR	Speech and Drama
Stat	Statistics
Surg	Surgery
TCom	Telecommunication Operations
U&RP	Urban and Regional Planning
Urol	Urology
WStu	Women's Studies

Applied Science

Interdepartmental offerings.

UNDERGRADUATE COURSES

57 Analytical Mechanics I (2)

First half of a one-year sequence. Concepts of statics, including force systems, equilibrium conditions, simple structures, distributed forces, shear and moments, friction and the concept of work, virtual work and stability. Prerequisite or concurrent registration: ApSc 113, Phys 14. (Fall and spring)

58 Analytical Mechanics II (3)

Second half of a one-year sequence. Concepts of dynamics, including kinematics of particles, velocity and acceleration, Newton's laws of motion, momentum, work, kinetic energy, potential energy, central force fields, vibrations, resonance, dynamics of systems of particles, kinematics of a rigid body, dynamics of a rigid body. Introduction to Lagrangian-Hamiltonian formulation. Prerequisite: ApSc 57. (Fall and spring)

113 Engineering Analysis I (3)

Analytical methods appropriate to the solution of engineering problems, including application of matrices and linear algebra, ordinary differential equations, vector calculus and integral theorems, complex algebra. Prerequisite: Math 32. (Fall and spring)

114 Engineering Analysis II (3)

Analytical methods appropriate to the solution of engineering problems, including application of Bessel functions, Legendre polynomials, Fourier series and integrals, Laplace transforms, partial differential equations in engineering and applied science. Prerequisite: ApSc 113. (Fall and spring)

115 Engineering Analysis III (3)

Solution of engineering problems using concepts from probability and statistics, including random variables, distribution functions, mathematical expectation, point and confidence interval estimation, hypothesis testing, correlation, and regression. This methodology applied to problems of structural design, bioengineering, manufacturing processes, product quality, equipment reliability, engineering management, and societal engineering. Prerequisite: Math 32. (Fall and spring)

GRADUATE COURSES

211 Analytical Methods in Engineering I (3)

Engineering applications of the theory of complex variable contour integration, conformal mapping, inversion integral, ary-value problems. Prerequisite: approval of Department. spring)

212 Analytical Methods in Engineering II (3)

Analytical methods appropriate to the formulation of engine lems including finite dimensional vector spaces, eigenvalue pro eralized Fourier series, tensor calculus, curvilinear coordinates site: approval of Department. (Fall)

213 Analytical Methods in Engineering III (3)

Analytical techniques for solution of boundary-initial problem neering involving wave propagation, diffusion processes, and distributions. Prerequisite: approval of Department. (Fall a

214 Analytical Methods in Engineering IV (3)

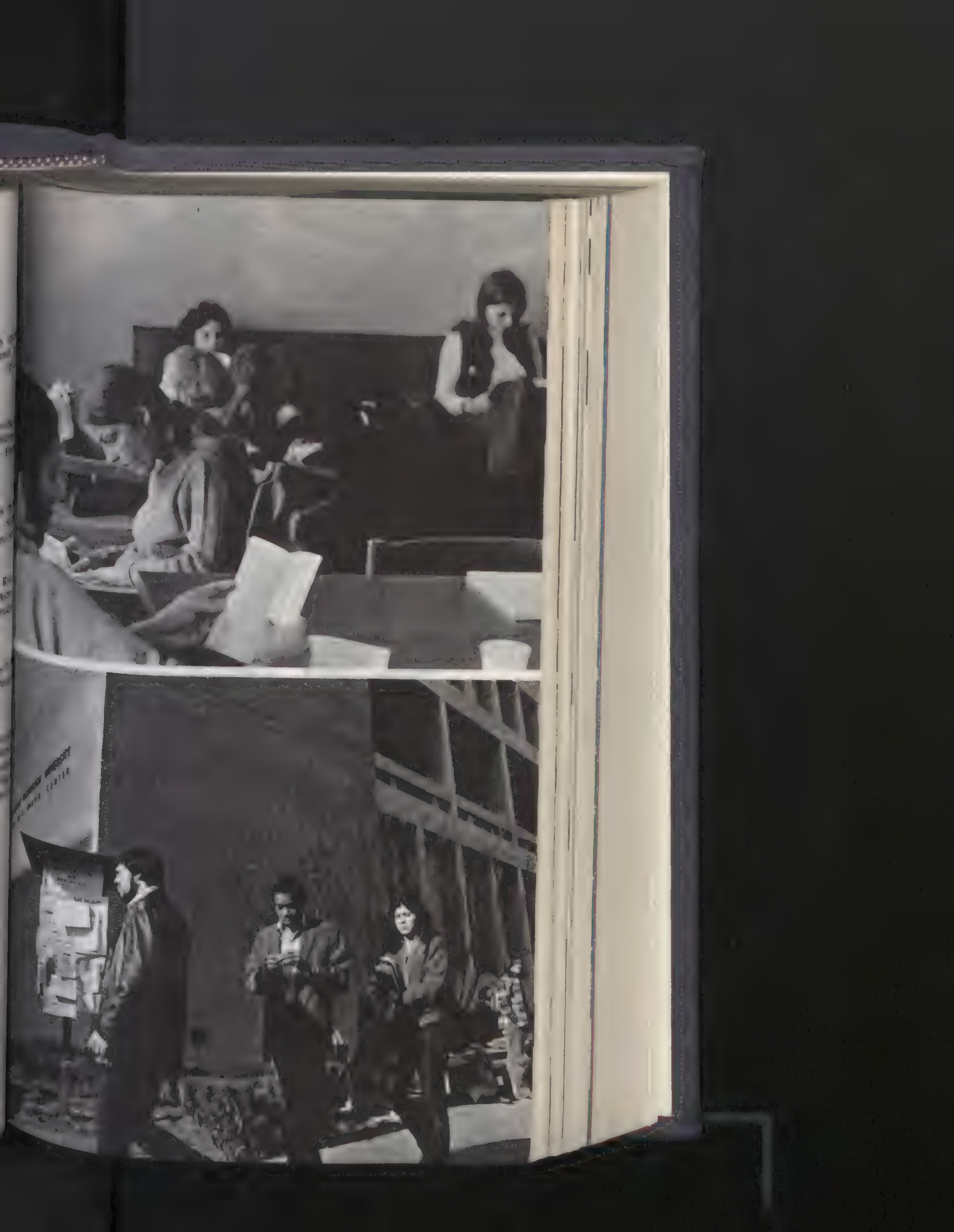
Introduction to variational methods in engineering including Galerkin approximation methods for boundary-value problems. linear integral equations arising from engineering analysis. Pr approval of Department. (Spring)

215 Analytical Methods in Engineering V (3)

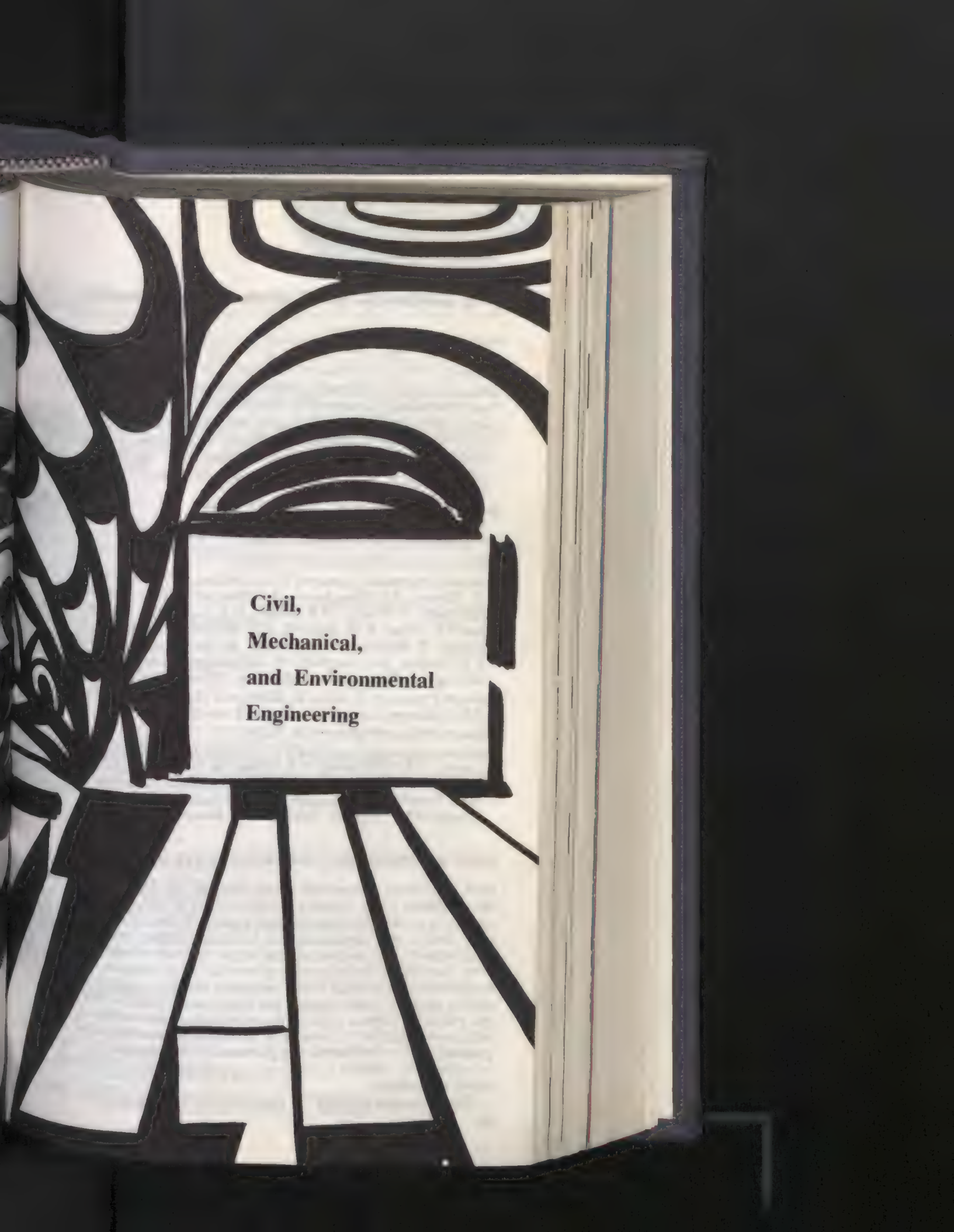
Advanced methods of solution of boundary-initial value problem neering, including characteristics, wave propagation, and Green's Prerequisite: ApSc 213. (Fall, odd years)

216 Special Topics in Engineering Analysis (3)

Selected topics such as (1) perturbation techniques applied to app solution of nonlinear boundary and initial value problems in eng (2) application of singular integral equations in problems of m (3) applications of elements of functional analysis in engineer science. Prerequisite: approval of Department. (Spring, even






Civil,
Mechanical,
and Environmental
Engineering

Civil, Mechanical, and Environmental Engineering

Professors G.M. Arkilic, R.R. Fox, H. Liebowitz, S.W. Yuan *(C*
J. Foa, J.E. Feir, T.G. Toridis, H.V. Nutt *(Research)*, J.P. Camp
search), J. Eftis, A.K. Noor, R. Goulard, A.B. Cambel

Adjunct Professors J.E. Duberg, B.L. Clarkson, E.C. Kollmann, R.M
sen, Y. Gordon, H. Perry, L.W. Tombaugh

Professorial Lecturers R.E. Fulton, R. Wilson, J. Kirshner, M.P. Ga
Reid, R. Dillon, C. Molloy, W. Olstad, M.J. Queijo, R.P. Nales
Scalzi, P. Donely, M.K. Ochi, R.F. Baker, F.L. Young, L.K. Lo
M.S. Ojalvo, L. Divone, L.G. Herman, J. Menkes, R.C. Warder, J
Thomson, M. Yachnis

Associate Professors A.M. Kiper, M.K. Myers, D.L. Jones *(Researc*
Whitesides, Jr., C. Gilmore, J.C. Yu, H. Runyan, Jr. *(Research)*, D.M
ling *(Research)*, A.M. Bloom *(Research)*

Adjunct Associate Professor B.W. Hannah

Associate Professorial Lecturers W.D. Erickson, R.W. Fralich, E.C. Ya
N. Salvesen, J.D. Shaughnessy, J. Sobieszczanski, M. Stein, G. Sabni
Samworth, B. Whang, M.B. Barker, G.E. Lamphere, N. Basdekas, I
son, J.B. Fisher, R.W. Barnwell, J.D. Buckley, A. Sosslau, R.J. Fishe
Burgett, T. McGean, D. MacKinnon, K. Saczalski, T.M. Walsh, P.B.
E.F. Skelton, H.A. Leybold, M. Lokmanhekim, A.G. Adamantiade
Belding, Jr., R.M. Brown, J. Ettinger, H.E. Bethel, D.D. Moran, T.F

Assistant Professors Y. Chiu, K. Khozeimeh *(Research)*, R.S. Brice *(Res*
B.R. Barkstrom *(Research)*, J.D. Lee *(Research)*

Adjunct Assistant Professor A.K. Trehan

Assistant Professorial Lecturers J.A. Gorman, I.E. Beckwith, R.L. Bowle
Hardin, C.J. Jachimowski, J.B. Robertson, G.L. Smith, R.Y. Ting, J.E.
ter, C.E. Kirby, R.C. Montgomery, K.S. Park, T.A. Straeter, E. G
A.H. Purcell, J. Schiess, J.N. Shoosmith, D. Mulville, C. Papadakis
Wagner, S.M. Finger, A. Kehnemui, M. Rozansky

CIVIL ENGINEERING—UNDERGRADUATE STUDY

Civil engineering encompasses those branches of engineering activities
closely related to the control and improvement of our environment and o
conditions of life. Study in this field prepares students for careers in the
ning, design, and construction of buildings; bridges; roads; airports;
transportation systems; harbors; off-shore facilities; coastal protection s
tures; flood and pollution control systems for rivers, estuaries, and lakes; in
navigation systems; large power generation and flood control dams; water
sources projects; urban renewal and development projects; and pollution
trol and waste disposal projects. It also provides the scientific and technolog
background required for careers in municipal engineering, urban and regio
planning, and environmental and geotechnical civil engineering; and for care
in engineering research in structural mechanics, ocean engineering, and
terials engineering.

The curriculum provides the essentials for beginning a career upon grad

tion, for registration as a professional civil engineer as required by law, and for continuing study at the graduate level.

Evening Classes

In response to requests from those employed full time in the Washington, D.C., area who wish to obtain a Bachelor of Science degree in Civil Engineering in a reasonable period of time, evening classes in the Civil Engineering curriculum are scheduled on a regular basis. For example, if a part-time student enrolls for three courses a semester, B.S. degree requirements can be completed in less than 15 semesters.

Core Curriculum

Normally the first four semesters are common to all undergraduate fields in the School of Engineering and Applied Science.

First Semester

EE 51:	Applications of Computers (3)
Math 30:	Precalculus (3)
Math 31:	Calculus of One Variable (3)
Phys 3:	Foundations of Physics (3)
Elective:	Selected from humanities or social sciences (3)

Second Semester

EngS 4:	Descriptive Geometry and Drafting (3)
Engl 9 or 10:	English Composition: Language as Communication (3)
Math 32:	Calculus of Several Variables (3)
Phys 14:	Introductory Mechanics and Thermal Physics (3)
Elective:	Selected from humanities or social sciences (3)

Third Semester

ApSc 57:	Analytical Mechanics I (2)
ApSc 113:	Engineering Analysis I (3)
ApSc 115:	Engineering Analysis III (3)
Chem 13:	General Chemistry (4)
Phys 15:	Elements of Electricity and Magnetism (3)
Elective:	Selected from humanities or social sciences (3)
	(May be taken during the Summer Sessions)

Fourth Semester

ApSc 58:	Analytical Mechanics II (3)
ApSc 114:	Engineering Analysis II (3)
CE 110:	Introduction to Environmental Engineering (3)
CE 140:	Materials Science (3)
Phys 16:	Introduction to Modern Physics (3)
Elective:	Selected from humanities or social sciences (3)
	(May be taken during the Summer Sessions)

Civil Engineering Curriculum

Fifth Semester

CE 120: Introduction to the Mechanics of Solids (4)
CE 123: Structural Theory (6)
CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
ME 131: Thermodynamics (3)

Sixth Semester

CE 183: Urban Planning (3)
CE 190: Legal and Economic Aspects of Engineering (2)
Geol 136: Engineering Geology (3)
ME 126: Fluid Mechanics (3)
Elective: Selected from humanities or social sciences (6)

Seventh Semester

CE 168: Introductory Soil Mechanics (3)
CE 191: Metal Structures (3)
CE 193: Hydraulics (3)
CE 194: Environmental Engineering I: Water Supply and Resour
Elective: Technical electives (6)

Eighth Semester

CE 182: Foundation Engineering (2)
CE 185: Soil Mechanics and Foundation Engineering Laboratory
CE 192: Reinforced Concrete Structures (3)
CE 197: Environmental Engineering II: Waste and Pollution Cont
Elective: Technical electives (5)

Technical Electives

*CE 195: Hydrology (3)
*CE 196: Design and Cost Analysis of Civil Engineering Structures
CE 201: Design of Metal Structures (3)
CE 202: Design of Reinforced Concrete Structures (3)
CE 204: Applied Soil Mechanics I (3)
CE 205: Applied Soil Mechanics II (3)
CE 206: Foundation Engineering (3)
CE 210: Methods of Structural Analysis (3)
CE 215: Urban Construction Technology (3)
CE 216: Advanced Hydrology (3)
CE 217: Water Resources Engineering I (3)
CE 220: Urban Transportation Engineering (3)
CE 243: Environmental Impact Assessment (3)
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 256: Introduction to Ocean and Coastal Engineering (3)
EAd 150: Introduction to Engineering Administration (3)
EngS 234: Composite Materials (3)

* Required course which must be selected from the technical electives

Computer-oriented Civil Engineering Option

The expanding use of computers in the design and control of engineering systems provides increasing opportunities for engineering careers in which proficiency in the sophisticated use of digital and other computers is essential. This option replaces several technical electives of the principal professional undergraduate program with electives that provide a more comprehensive exposure to computer technology and applications.

Technical Electives for Computer-oriented Civil Engineering Option

*CE 196:	Design and Cost Analysis of Civil Engineering Structures (3)
CE 210:	Methods of Structural Analysis (3)
CSci 278:	Analog and Hybrid Computers (3)
EE 152:	Introduction to Digital Computers (3)
EngS 282:	Computer-aided Design (3)
EngS 283:	Application of Computer Graphics in Engineering (3)
EngS 284:	Numerical Methods in Engineering (3)

Environmental-oriented Civil Engineering Option

The world-wide growth of industrialization is causing increasing concern for protection of the human environment. Part of this problem involves water supply and treatment, pollution of rivers, lakes, and oceans, and solid waste treatment and disposal. Through a selective choice of technical electives the student is provided with an opportunity to gain increased exposure to this developing aspect of civil engineering.

Technical Electives for Environmental-oriented Civil Engineering Option

*CE 195:	Hydrology (3)
*CE 196:	Design and Cost Analysis of Civil Engineering Structures (3)
CE 240:	Environmental Microbiology (3)
CE 241:	Environmental Chemistry (3)
CE 242:	Solid Waste Disposal (3)
CE 243:	Environmental Impact Assessment (3)
Bioc 221:	General Biochemistry (3 or 4—4 or 5)
BiSc 11–12:	Introductory Biology for Science Majors (4–4)
†Chem 50:	Introduction to Organic Chemistry (4)
EngS 242:	Materials Recycling and Recovery (3)
ME 176:	Environmental Engineering Problems (3)
†Micr 211:	Microbiology (4)

Geotechnical Civil Engineering Option

Geotechnical civil engineering encompasses engineering problems involving soil mechanics, foundation engineering, rock mechanics, and geological aspects of engineering. More specifically, planning, design, and construction of

* Required course which must be selected from the technical electives.
† For Chemistry and Microbiology course descriptions, see the *Undergraduate and Graduate Catalogue*.

structures founded on or constructed of soil and rock constitute the ma
tures of this branch of civil engineering. Included are the design and co
tion of foundations for all types of buildings, bridges, highway and a
pavements; design and construction of earth and rock-fill dams, embank
waterfront structures, tunnels, drainage facilities, and stabilization proc
for reclamation of marginal lands. Engineering geology, which is the ap
tion of geological data, principles, and interpretations to naturally occ
earth and rock masses, constitutes an important part in the planning
design stages of civil engineering structures of the above type. The Geo
cal Civil Engineering option provides the student with the fundamenta
subsequent growth and development in this branch of civil engineering.

CURRICULUM

Prerequisite: first four semesters as described in the Core Curriculum
page 57, with the following changes:

Third Semester: *Geology 21 *Physical and Evolutionary Geology* (3),
be taken instead of the elective.

Fourth Semester: *Geology 122 *Structural Geology* (3), will be take
stead of (a) CE 110 *Introduction to Environmental Engineering* and
elective.

Fifth Semester

CE 120:	Introduction to the Mechanics of Solids (4)
CE 123:	Structural Theory (6)
ME 131:	Thermodynamics (3)
*Geol 163:	Sedimentation (4)

Sixth Semester

ME 126:	Fluid Mechanics (3)
CE 190:	Legal and Economic Aspects of Engineering (2)
*Geol 128:	Geomorphology (3)
*Geol 136:	Engineering Geology (3)
Elective:	Selected from humanities or social sciences (6)

Seventh Semester

CE 168:	Introductory Soil Mechanics (3)
CE 191:	Metal Structures (3)
CE 193:	Hydraulics (3)
CE 194:	Environmental Engineering I: Water Supply Resources (3)
CE 195:	Hydrology (3)
*Geol 189:	Geophysics for Geologists (3)

Eighth Semester

CE 182:	Foundation Engineering (2)
CE 185:	Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192:	Reinforced Concrete Structures (3)
*Geol 195:	Field Work (2)
Elective:	Selected from humanities or social sciences (6)
Elective:	Technical elective (2)

* For Geology course descriptions, see the *Graduate and Undergraduate Catalogue*.

Civil Engineering Undergraduate Courses

110 Introduction to Environmental Engineering (3)

Chemistry of natural water as it affects hardness, alkalinity, corrosion, and carbonate balance. Water treatment chemistry, softening, coagulation, and flocculation. Chemistry of rivers, oxygen balance, nitrogen cycle, carbon cycle, eutrophication. Waste water treatment. Removal of dissolved organic material, nitrogen, phosphorous, and chlorination. Classification of organic and inorganic air pollutants. Chemical reaction and formation of secondary air pollutants. Chemical analysis of inorganic pollutants; fluorides, oxides of nitrogen, sulfates, chlorides, sulfur compounds, oxides of carbon, and oxidants. Chemical analysis of organic pollutants; aliphatic hydrocarbons. Control of pollutant emission by absorption, adsorption, and combustion. Prerequisite: Chem 13. (Spring)

120 Introduction to the Mechanics of Solids (4)

Three-dimensional strain and stress. Constitutive equations for elastic, viscoelastic, and plastic materials. Axial load, bending and torsion of struts and beams. Instability and failure. Prerequisite: ApSc 58. (Fall)

123 Structural Theory (6)

Theory of determinate and indeterminate structures using both classical and modern approaches. Prerequisite or concurrent registration: CE 120. (Fall)

140 Materials Science (3)

Electron structure of atoms; atomic and molecular bonding; energy bands; crystal structure; imperfections; noncrystalline solids; reaction rates; diffusion; transport phenomena—thermal conductivity, electrical conduction; semiconductors; magnetism; elasticity and anelastic phenomena; microplasticity; plastic deformation; fracture. Prerequisite or concurrent registration: Phys 16. (Spring)

166 Materials Engineering (2)

Mechanical properties and their description; effect of microstructure on the mechanical behavior of metals, ceramics, polymers, and polyphase materials; effect of strain-rate and temperature; creep, fatigue, and fracture; effect of surface and environment; materials evaluation for structural performance. Prerequisite or concurrent registration: CE 120, 140; or approval of Department. (Fall)

167 Mechanics of Materials Laboratory (1)

Measurement of strains and study of failure resulting from applied forces; ductile, brittle, anisotropic, elastomeric and plastic materials; tension, compression, bending, creep, and fatigue loading. Prerequisite or concurrent registration: CE 166. (Fall)

168 Introductory Soil Mechanics (3)

Engineering properties of soils; analysis of lateral earth pressures, bearing capacity, foundations, and slope stability. Prerequisite: CE 120, ME 126. (Fall)

182 Foundation Engineering (2)

Subsurface exploration, design of shallow foundations, design of pile foundations, earth-retaining structures. Prerequisite: CE 168. (Spring)

183 **Urban Planning** (3)
Engineering aspects of urban planning, including transportation, supply and sewerage, public utilities, safety and convenience, and environment. (Spring)

185 **Soil Mechanics and Foundation Engineering Laboratory** (1)
Laboratory experiments for the classification, strength, compressi and general engineering properties of soils. Prerequisite: CE 18 (Spring)

190 **Legal and Economic Aspects of Engineering** (2)
Laws relating to engineering practice, preparation of contract doc and specifications, consideration of economic factors in engineering decisions. (Spring)

191 **Metal Structures** (3)
Principles of the design of metal structures; structural elements; co tions; specific problems of analysis; methods of construction. Prereq CE 123. (Fall)

192 **Reinforced Concrete Structures** (3)
Principles of the design of reinforced concrete structures. Details of forcement of structural elements. Monolithic structures, precast elem methods of construction. Prerequisite: CE 123. (Spring)

193 **Hydraulics** (3)
Fluid statics: applications to calculation of boundary forces in a fluid, buoyancy, and flotation. Application of kinematic principles fields, stream tubes, and flow nets. Fluid dynamics: applications to flow, hydraulic models, measurement of pressure, and velocity. channel flow: applications to water resources engineering. Prereq ME 126. (Fall)

194 **Environmental Engineering I: Water Supply and Resources** (3)
Planning and design of water supply and waste-water disposal sys Water quality control and treatment processes. Desalination, s pollution control. Prerequisite or concurrent registration: CE 19 (Spring)

195 **Hydrology** (3)
Descriptive hydrology: hydrologic cycle, precipitation, stream flow oration, and transpiration. Quantitative hydrology: hydrograph an estimating volume of runoff, runoff from snow, hydrographs of base flow, storage routing. Probability concepts in hydrology: flood freq rainfall frequency, drought, stochastic hydrology. Prerequisite: Apt ME 126, and CE 193, which may be taken concurrently. (Fall)

196 **Design and Cost Analysis of Civil Engineering Structures** (3)
Design of civil engineering structures such as wharves, piers, built tunnels, dams, bridges, water treatment, and drainage systems. Pre site: senior status. (Spring)

197 **Environmental Engineering II: Waste and Pollution Control** (3)
Disposal of sewage, biological treatment, chemical treatment, filte activated sludge, sludge handling and disposal. Control of indu wastes and of nuclear waste products. Solid waste disposal. Prereq CE 193. (Fall)

198 **Research (1 to 3)**

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

MECHANICAL ENGINEERING—UNDERGRADUATE STUDY

hanical engineering is primarily concerned with physical systems in mo- A mechanical engineer is concerned with the conversion, transfer, and ol of energy from its source to its moving system. Land and marine ve- , transportation systems, air-conditioning systems, nuclear reactors and cells, low-pollution control devices, energy resources and the means of prac- and economical conversion of the various forms of energy to mechanical electrical power, and a host of other devices lie in this domain. His train- hould provide him with the ability to formulate problems based on funda- al laws of nature, to recognize the types of methods which are applicable eir solution, to read with understanding the relevant work, and to come ith a usable answer. The mechanical engineering curriculum provides a ground for careers in research, design, development, and manufacture in le variety of industries.

urse offerings in mechanical engineering, which begin with a broad dation in physics, chemistry, mathematics, humanities, and social sciences, st of studies in basic mechanics of solids and fluids, electricity and ronics, material sciences, dynamic analysis, thermal sciences, energy con- on and power, environmental control, and the design of machines and ms and their control. Technical electives in the senior year allow students ested in computers to select an option which will prepare them for careers mputing as well as graduate study in computer-dominated or computer- ted professional fields. The program outlined below is based on the con- that the mechanical engineer must be prepared to meet the challenge of increasing technical, economic, and social problems.

raduates are qualified for professional positions in design, analysis, manu- re, and application of machines, process, and control, or in research and lopment, as well as for graduate work.

ing Classes

sponse to requests from those employed full time in the Washington, D.C., who wish to obtain a Bachelor of Science degree in Mechanical Engineer- n a reasonable period of time, evening classes in the Mechanical Engineer- curriculum are scheduled on a regular basis. For example, if a part-time ent enrolls for three courses a semester, B.S. degree requirements can be pleted in less than 15 semesters.

or Year Abroad Program

School of Engineering and Applied Science and the Institute of Sound and ation Research of the University of Southampton, England, have estab- d an exchange program so that graduate students in acoustics at both insti- ns may transfer academic credits to either University in fulfillment of the irements for advanced degrees. A special arrangement has now been made

to extend the graduate exchange program to the undergraduate level, and some mechanical engineering students to spend the junior year abroad.

The program furthers a student's particular academic interests in mech. engineering and develops knowledge of world affairs in general, and i national technical fields in particular.

Applicants must apply for admission to the Junior Year abroad prog the Department Chairman before the end of the fall semester of the sopho year. Approval must be given by the Department Chairman and the Dea the School of Engineering and Applied Science.

Core Curriculum

Normally the first four semesters are common to all undergraduate fields i School of Engineering and Applied Science.

First Semester

EE 51:	Applications of Computers (3)
Math 30:	Precalculus (3)
Math 31:	Calculus of One Variable (3)
Phys 3:	Foundations of Physics (3)
Elective:	Selected from humanities of social sciences (3)

Second Semester

EngS 4:	Descriptive Geometry and Drafting (3)
Engl 9 or 10:	English Composition: Language as Communciation (3)
Math 32:	Calculus of Several Variables (3)
Phys 14:	Introductory Mechanics and Thermal Physics (3)
Elective:	Selected from humanities or social sciences (3)

Third Semester

ApSc 57:	Analytical Mechanics I (2)
ApSc 113:	Engineering Analysis I (3)
ApSc 115:	Engineering Analysis III (3)
Chem 13:	General Chemistry (4)
Phys 15:	Elements of Electricity and Magnetism (3)
Elective:	Selected from humanities or social sciences (3) (May be taken during the Summer Sessions)

Fourth Semester

ApSc 58:	Analytical Mechanics II (3)
ApSc 114:	Engineering Analysis II (3)
CE 140:	Materials Science (3)
EE 11:	Linear Networks I (3)
Phys 16:	Introduction to Modern Physics (3)
Elective:	Selected from humanities or social sciences (3) (May be taken during the Summer Sessions)

Mechanical Engineering Curriculum

Fifth Semester

CE 120:	Introduction to the Mechanics of Solids (4)
CE 166:	Materials Engineering (2)

CE 167: Mechanics of Materials Laboratory (1)
ME 131: Thermodynamics (3)
ME 134: Introduction to Vibration Analysis (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 20: Introductory Engineering Electronics (3)
EE 172: Control Systems (3)
ME 120: Methods of Engineering Experimentation (2)
ME 126: Fluid Mechanics (3)
ME 148: Thermodynamic Analysis (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

ME 155: Compressible Fluid Flow (3)
ME 187: Heat Transfer Theory (3)
ME 190: Mechanisms, Analysis and Synthesis (3)
ME 191: Mechanical Design (3)
Elective: Technical electives (6)

Eighth Semester

ME 152: Mechanical Engineering Laboratory (2)
ME 193: Engineering Systems Design (3)
ME 194: Energy Conversion (3)
Elective: Technical electives (6)

Technical Electives

CE 197: Environmental Engineering II: Waste and Pollution Control (3)
EAd 150: Introduction to Engineering Administration (3)
EAd 160: Introduction to Engineering Economic Analysis (3)
EngS 251–52: Transportation Workshop (3–3)
*ME 176: Environmental Engineering Problems (3)
ME 215: Theory of Vibrations (3)
ME 221: Intermediate Fluid Mechanics (3)
ME 225: Turbomachinery I (3)
ME 237: Propulsion (3)
ME 240: Kinematic Synthesis (3)
ME 247: Fluidics (3)

Technical Electives for Computer-oriented Mechanical Engineering Option

CSci 278: Analog and Hybrid Computers (3)
EE 152: Introduction to Digital Computers (3)
EE 157: Machine and Assembly Language Programming (3)
EngS 282: Computer-aided Design (3)
EngS 283: Application of Computer Graphics in Engineering (3)
EngS 284: Numerical Methods in Engineering (3)
*ME 176: Environmental Engineering Problems (3)

equired course which must be selected from the technical electives.

Technical Electives for Energy Resources and Power-ori
Mechanical Engineering Option

EE 177:	Electrical Energy Conversion (3)
EngS 208:	Energy Conservation (3)
EngS 214:	Geothermal Energy (3)
*ME 176:	Environmental Engineering Problems (3)
ME 224:	Fundamentals of Combustion Engines (3)
ME 225:	Turbomachinery I (3)
ME 237:	Propulsion (3)
ME 259:	Solar Heating and Cooling Systems (3)
ME 260:	Heating, Refrigeration, and Air Conditioning (3)
ME 283:	Nuclear Reactor Engineering I (3)
ME 294:	Wind Energy (3)

Mechanical Engineering Undergraduate Courses

120 **Methods of Engineering Experimentation** (2)

Acquisition and analysis of experimental data. Laws of modeling simulation. Report formulation and presentation. Basic principles of rious measuring instruments and sensors. Laboratory experiments, ing use of strain gages, oscilloscopes, various tranducers, etc. Introduc to basic experimental techniques related to dynamics, fluid flow, thermal sciences. Prerequisite: CE 120, ME 131. (Spring)

126 **Fluid Mechanics** (3)

Fluid properties, regimes in fluid mechanics, fluid statics, fluid kinemat basic equations, one- and two-dimensional inviscid incompressible fl viscous incompressible flow, dimensional method. Prerequisite: ApSc (Spring)

131 **Thermodynamics** (3)

Fundamental thermodynamic concepts, Zeroth law of thermodynam and temperature measurements, work and heat, first law of thermod namics, properties of pure substances, first-law analysis of some therm dynamic systems, second law of thermodynamics, reversibility, entro second-law analysis of thermodynamic systems. Prerequisite or concurr registration: ApSc 58. (Fall)

134 **Introduction to Vibration Analysis** (3)

Natural frequencies and response of single- and multiple-degree of fr dom mechanical systems to dynamic loads. Effect of damping, transie and steady-state analysis. Prerequisite: ApSc 58. (Fall)

148 **Thermodynamic Analysis** (3)

Analysis of thermodynamic power and refrigeration cycles; thermo namics of mixtures of substances; properties of air-water vapor mixtu psychrometry and analysis of cooling tower and air-conditioning pr third law of thermodynamics and absolute entropy; evaluation of combu tion processes. Molecular distributions and models; introduction to s tistical and quantum mechanics; statistical thermodynamics and thermo namic properties of gases and solids. Prerequisite: ME 131. (Sprin

* Required course which must be selected from technical electives.

152 Mechanical Engineering Laboratory (2)

Experimental study of various engineering systems. Laboratory projects include experimental design, modeling and simulation parameters, data acquisition, and report presentation techniques. Prerequisite: ME 120. (As arranged)

155 Compressible Fluid Flow (3)

Introduction to compressible flow, basic equations, propagation of motion in compressible fluids, isotropic-flow relations, steady one-dimensional flow, wave phenomena, small perturbation theory, slender-body theory, method of characteristics. Prerequisite: ME 126, 131. (Fall)

176 Environmental Engineering Problems (3)

Classification and effects of air pollutants; air-quality criteria and standards; analysis of pollutants; sources of pollutants and emission inventory; emission-control equipment. Water-quality standards; sewage and industrial waste characterization and pollutional effects in natural waters; primary, biological, and tertiary treatment of wastes; sludge handling and disposal. Prerequisite: senior status. (Fall)

187 Heat Transfer Theory (3)

Heat transfer processes. General heat conduction equations; steady- and unsteady-state heat conduction problems. Methods of analysis; analytical, analog, and numerical solution methods. Fundamentals of convective-heat transfer. Evaluation of convective-heat transfer coefficients; dimensional analysis, boundary-layer approach, analogy between heat and momentum transfer. Energy exchange by thermal radiation; fundamental concepts and laws, radiation properties, radiative-heat transfer between surfaces. Design considerations; heat-exchanger design and selection. Prerequisite: ME 126. (Fall)

190 Mechanisms, Analysis and Synthesis (3)

Kinematics and dynamics of mechanisms. Displacement, velocities, accelerations in linkage and cam systems by analytical and graphical methods. Prerequisite: ApSc 58. (Fall)

191 Mechanical Design (3)

Introduction to design concept, selection of materials, and strength of mechanical elements; design of machine components such as shafts, springs, bearings, gears, couplings, screws, and related mechanical components. Prerequisite: senior status. (Fall)

193 Engineering Systems Design (3)

Principles of creative design and system-design concept. Engineering economics, modeling and simulation of physical systems, optimization techniques. Analog and digital computer-aided design methods. Special design projects which may integrate with ME 152 *Mechanical Engineering Laboratory* projects. Prerequisite: ME 191. (Spring)

194 Energy Conversion (3)

Energy resources of the earth; energy, society, and the national economy; issue of energy and the environment, future outlook for energy supply and demand. Conversion of energy; fundamental principles and technological options, efficiency of different energy converters. Current technologies and longer-range possibilities. Generation of electricity, trends in the electricity industry; nuclear power systems—growth, economic, and

environmental impacts. Unconventional methods of power generat
rect energy conversion. Prerequisite: EE 20, ME 148. (Spring)

198 **Research** (1 to 3)

Applied research and experimentation projects, as arranged. Pre
site: junior or senior status. (Fall and spring)

ENGINEERING SCIENCE—UNDERGRADUATE COURSE

4 **Descriptive Geometry and Drafting** (3)

Introductory descriptive geometry. Use of equipment. Points,
curves, planes, and surfaces; principal, auxiliary, and orthographic
isometric views, intersection of surface. Technical sketching, dime
and precision, machine elements. Detail and assembly drawings.
tural elements. Layout and fabrication drawings, pipe and electric
(Spring)

GRADUATE STUDY

Developments in science and technology in the decades to come require
the engineer be thoroughly grounded in fundamentals as well as in the
emerging technological and scientific disciplines. The modern engineer
also master techniques in analysis, computation, design, and synthesis.
the proliferation of knowledge and technological specialty, the Department
heres to the principle that versatility and depth in scientific fundamentals sh
be the characteristic features of any graduate program that attempts to pre
the student to cope with engineering developments.

The Department of Civil, Mechanical and Environmental Engineering of
graduate programs in the various areas of concentration on three degree lev
the Master of Science degree, the Professional degree and the Doctor
Science degree.

The Doctor of Science degree is offered in the following areas: Acoust
Energy Resources and Environment, Flight Sciences, Fluid Mechanics
Thermal Sciences, Hydromechanics and Ocean Engineering, Solid Mechan
and Materials Engineering, Structural Engineering, Structures and Dynam
and Transportation Engineering (except Option III which is for M.S.
Professional degrees only).

The Master of Science and the Professional degrees are offered in all
aforementioned areas and in the following areas: Environmental Civil En
neering, Environmental Modeling, Geotechnics and Foundation Engineer
Mechanical Engineering Design, and Public Works Engineering.

Courses for these specializations are listed in subsequent pages. As part
the interdisciplinary program, students elect approved courses from other
partments of the School of Engineering and Applied Science, as well as fr
other schools and divisions of the University. Depending upon the interest
the student, some of the programs leading to the degrees of Master of Scien
and, by special permission of the appropriate department chairman, Doctor
Science are given at the NASA-Langley Research Center, Langley Stat
Hampton, Va. NASA-Langley's extensive scientific and engineering facil
and equipment are utilized whenever feasible.

Each program is arranged to fit the student's individual needs and interests and utilize previous experience and background. This background should normally include an undergraduate degree in engineering, the physical sciences, or applied mathematics. Each student is assigned a faculty adviser on the basis of study interests, enabling a close student-faculty relationship to develop during the course of the program.

Fields and Area of Concentration

Programs of study in any field of concentration will generally include courses from appropriate allied areas.

ACOUSTICS*

ApSc 211: Analytical Methods in Engineering I
ApSC 212: Analytical Methods in Engineering II
ApSc 213: Analytical Methods in Engineering III
ApSc 215: Analytical Methods in Engineering V
*EngS 203–4: Special Topics in Engineering Analysis
*EngS 217: Probability and Statistics of Metrology
EngS 270: Analytical Mechanics
*EngS 271: Introduction to Acoustics
*EngS 272: Random Process Theory I
*EngS 273: Random Process Theory II
EngS 274: Time Series Analysis
*EngS 275: Noise and Vibration Control
*EngS 276: Advanced Theoretical Acoustics
*EngS 277: Acoustical and Mechanical Measurements
*EngS 278: Physical Acoustics
*EngS 279: Psychological and Physiological Acoustics
*EngS 280: Human Factors in Engineering
EngS 298: Special Topics in Acoustics
EngS 299–300: Research
*EngS 310: Thesis Research
*EngS 311: Aeroacoustics
*EngS 312: Nonlinear Acoustics
*EngS 313: Theory of Random Vibration
EngS 398: Structural Acoustic Interaction
EngS 399: Advanced Reading and Research
ME 215: Dissertation Research
ME 216: Theory of Vibrations
ME 221: Structural Dynamics
ME 312: Intermediate Fluid Mechanics
Theory of Turbulence

ENERGY, RESOURCES AND ENVIRONMENT

ApSc 211: Analytical Methods in Engineering I
ApSc 213: Analytical Methods in Engineering III
ApSc 214: Analytical Methods in Engineering IV
ApSc 215: Analytical Methods in Engineering V
CE 242: Solid Waste Disposal

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

CE 243: Environmental Impact Assessment
EE 133: Electromagnetic Waves
EE 236: Plasma Dynamics
EAd 221–22: Environmental Management
EngS 206: Technology and Human Needs
EngS 207: Engineering Climatology
EngS 208: Energy Conservation
EngS 210: Quantitative Aspects of Social Phenomena
EngS 212: Nonrenewable Resources
EngS 213: Renewable Resources
EngS 214: Geothermal Energy
EngS 270: Introduction to Acoustics
EngS 274: Noise and Vibration Control
ME 204: Advanced Instrumentation Techniques
ME 221: Intermediate Fluid Mechanics
ME 224: Fundamentals of Combustion Engines
ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 227: Viscous Flow
ME 235: Compressible Flow
ME 237: Propulsion
ME 250: Energy Systems Design
ME 259: Solar Heating and Cooling Systems
ME 260: Heating, Refrigeration, and Air Conditioning
ME 261: Fundamentals of Environmental Control I
ME 262: Fundamentals of Environmental Control II
ME 263: Environmental Control Processes I
ME 264: Environmental Control Processes II
ME 265: Air-pollution Meterology
ME 266: Experimental Methods for Environmental Control
ME 280: Advanced Thermodynamics
ME 281: Nonequilibrium Thermodynamics
ME 282: Energy Technology
ME 283: Nuclear Reactor Engineering I
ME 284: Nuclear Reactor Engineering II
ME 287: Heat Conduction
ME 288: Convective Heat and Mass Transfer
ME 289: Radiative Heat Transfer
ME 291–92: Power Systems
ME 293: Combustion
ME 294: Wind Energy
ME 295: Statistical Thermodynamics
ME 298: Research
ME 299–300: Thesis Research
ME 312: Theory of Turbulence
ME 398: Advanced Reading and Research
ME 399: Dissertation Research
OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation

ENVIRONMENTAL CIVIL ENGINEERING

ApSc 213: Analytical Methods in Engineering III
Bioc 221: General Biochemistry

CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 211: Waste Water Treatment
CE 216: Advanced Hydrology
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineering II
CE 237: Advanced Sanitary Engineering Design
CE 240: Environmental Microbiology
CE 241: Environmental Chemistry
CE 242: Solid Waste Disposal
CE 243: Environmental Impact Assessment
CE 272: Advanced Waste Treatment Process Design
CE 277: Industrial Waste Treatment
CE 278: Pollution Transport System
CE 298: Research
CE 299–300: Thesis Research
EAd 204: Administration of Engineering Contracts
EAd 210: Engineering Law
EAd 261: Economic Analysis in Engineering Planning
EngS 242: Materials Recycling and Recovery
EngS 284: Numerical Methods in Engineering
ME 262: Fundamentals of Environmental Control II
ME 263: Environmental Control Processes I
*Micr 211: Microbiology
*U&RP 204: Urban Development Planning

ENVIRONMENTAL MODELING†

ApSc 211: Analytical Methods in Engineering I
ApSc 213: Analytical Methods in Engineering III
†EngS 263: Atmospheric Physics for Engineers I
†EngS 264: Atmospheric Physics for Engineers II
EngS 284: Numerical Methods in Engineering
EngS 298: Research
EngS 299–300: Thesis Research
EngS 314: Advanced Numerical Methods in Engineering
ME 221: Intermediate Fluid Mechanics
ME 227: Viscous Flow
ME 231: Hydrodynamics
ME 265: Air-pollution Meteorology
ME 282: Energy Technology
ME 285: Reaction Kinetics
ME 288: Convective Heat and Mass Transfer
ME 289: Radiative Heat Transfer
ME 296: Special Topics in Heat and Mass Transfer
ME 312: Theory of Turbulence

LIGHT SCIENCES†

ApSc 211: Analytical Methods in Engineering I
ApSc 212: Analytical Methods in Engineering II

*For Microbiology and Urban and Regional Planning course descriptions, see the *Undergraduate* and *Graduate Catalogue*.

†Offered at NASA-Langley Research Center; may be offered on campus when arranged.

ApSc 213:	Analytical Methods in Engineering III
ApSc 214:	Analytical Methods in Engineering IV
ApSc 215:	Analytical Methods in Engineering V
ApSc 216:	Special Topics in Engineering Analysis
EE 202:	Linear System Theory I
*EngS 217:	Analytical Mechanics
EngS 284:	Numerical Methods in Engineering
ME 215:	Theory of Vibrations
ME 221:	Intermediate Fluid Mechanics
ME 222:	Applied Fluid Dynamics
ME 223:	Aeroelasticity
ME 227:	Viscous Flow
ME 231:	Hydrodynamics
ME 235:	Compressible Flow
ME 237:	Propulsion
*ME 248:	Seminar: Aircraft Design I
*ME 249:	Seminar: Aircraft Design II
*ME 270:	Aerodynamics of Flight Vehicles
*ME 271:	VTOL Aircraft Technology
*ME 272:	STOL Aircraft Technology
*ME 273:	Principles of Automatic Flight Control
*ME 274:	Principles of Flight Guidance
ME 275:	Stability and Control of Vehicles
*ME 277:	Numerical Methods in Fluid Mechanics
*ME 278:	Performance, Stability, and Control of Helicopters
*ME 279:	Special Topics in Flight Sciences
ME 281:	Nonequilibrium Thermodynamics
*ME 290:	Kinetic Theory of Gases
ME 295:	Statistical Thermodynamics
ME 298:	Research
ME 299–300:	Thesis Research
ME 312:	Theory of Turbulence
ME 315:	Hypersonic Flow
ME 398:	Advanced Reading and Research
ME 399:	Dissertation Research

FLUID MECHANICS AND THERMAL SCIENCES

ApSc 211:	Analytical Methods in Engineering I
ApSc 212:	Analytical Methods in Engineering II
ApSc 213:	Analytical Methods in Engineering III
ApSc 214:	Analytical Methods in Engineering IV
ApSc 215:	Analytical Methods in Engineering V
ApSc 216:	Special Topics in Engineering Analysis
CE 274:	Mechanics of Water Waves
EE 133:	Electromagnetic Waves
EE 236:	Plasma Dynamics
EngS 218:	Introduction to Continuum Mechanics
EngS 289:	Special Topics in Theoretical and Applied Mechanics
ME 218:	Design of Floating and Submerged Marine Vehicles
ME 221:	Intermediate Fluid Mechanics
ME 222:	Applied Fluid Dynamics
ME 223:	Aeroelasticity
ME 227:	Viscous Flow

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

ME 231:	Hydrodynamics
ME 235:	Compressible Flow
ME 280:	Advanced Thermodynamics
ME 281:	Nonequilibrium Thermodynamics
ME 282:	Energy Technology
ME 287:	Heat Conduction
ME 288:	Convective Heat and Mass Transfer
ME 289:	Radiative Heat Transfer
ME 295:	Statistical Thermodynamics
ME 297:	Special Topics in Fluid Mechanics
ME 298:	Research
ME 299–300:	Thesis Research
ME 310:	Mechanics of Non-Newtonian Fluids
ME 311:	Nonsteady Flow
ME 312:	Theory of Turbulence
ME 315:	Hypersonic Flow
ME 317:	Physical Gas Dynamics
ME 398:	Advanced Reading and Research
ME 399:	Dissertation Research

GEOTECHNICS AND FOUNDATION ENGINEERING

ApSc 211:	Analytical Methods in Engineering I
ApSc 213:	Analytical Methods in Engineering III
CE 204:	Applied Soil Mechanics I
CE 205:	Applied Soil Mechanics II
CE 206:	Foundation Engineering
CE 207:	Soil Dynamics
CE 208:	Rock and Ice Mechanics
CE 209:	Theoretical Soil Mechanics
CE 217:	Water Resources Engineering I
CE 218:	Water Resources Engineering II
CE 219:	Groundwater and Seepage
CE 221:	Pavement and Runway Design
CE 256:	Introduction to Ocean and Coastal Engineering
CE 257:	Harbor and Coastal Engineering I
CE 265:	Special Topics in Geotechnical Engineering
CE 298:	Research
CE 299–300:	Thesis Research
EngS 221:	Theory of Elasticity I
EngS 256:	Introduction to the Theories of Inelastic Media
EngS 285:	Finite Element Methods in Engineering Mechanics
*Geol 128:	Geomorphology
*Geol 163:	Sedimentation
*Geol 189:	Geophysics for Geologists
*Geol 224:	Advanced Structural Geology

HYDROMECHANICS AND OCEAN ENGINEERING

ApSc 211:	Analytical Methods in Engineering I
ApSc 212:	Analytical Methods in Engineering II
ApSc 213:	Analytical Methods in Engineering III
ApSc 214:	Analytical Methods in Engineering IV
ApSc 215:	Analytical Methods in Engineering V

* For Geology course descriptions, see the *Undergraduate and Graduate Catalogue*.

ApSc 216:	Special Topics in Engineering Analysis
CE 203:	Prestressed Concrete Structures
CE 206:	Foundation Engineering
CE 208:	Rock and Ice Mechanics
CE 216:	Advanced Hydrology
CE 217:	Water Resources Engineering I
CE 218:	Water Resources Engineering II
CE 219:	Groundwater and Seepage
CE 253:	Failure and Reliability Analysis of Engineering Structures
CE 255:	Coastal Processes
CE 256:	Introduction to Ocean and Coastal Engineering
CE 257:	Harbor and Coastal Engineering I
CE 258:	Harbor and Coastal Engineering II
CE 265:	Special Topics in Geotechnical Engineering
CE 274:	Mechanics of Water Waves
CE 275:	Special Topics in Ocean Engineering
CE 298:	Research
CE 299–300:	Thesis Research
CE 398:	Advanced Reading and Research
CE 399:	Dissertation Research
EngS 228:	Physical Oceanography
EngS 260:	Random Process Theory in Engineering
*Geol 181:	General Oceanography
ME 218:	Design of Floating and Submerged Marine Vehicles
ME 221:	Intermediate Fluid Mechanics
ME 227:	Viscous Flow
ME 231:	Hydrodynamics
ME 297:	Special Topics in Fluid Mechanics

MECHANICAL ENGINEERING DESIGN (INCLUDING COMPUTER-ORIENTED DESIGN)

EngS 215:	Advanced Strength of Materials
EngS 251–52:	Transportation Workshop
EngS 282:	Computer-aided Design
EngS 283:	Application of Computer Graphics in Engineering
ME 215:	Theory of Vibrations
ME 218:	Design of Floating and Submerged Marine Vehicles
ME 221:	Intermediate Fluid Mechanics
ME 225:	Turbomachinery I
ME 226:	Turbomachinery II
ME 240:	Kinematic Synthesis
ME 241:	Engineering Systems Design
ME 243:	Advanced Mechanical Engineering Design
ME 246:	Electromechanical Control Systems
ME 247:	Fluidics
ME 250:	Energy Systems Design
ME 298:	Research
ME 299–300:	Thesis Research

PUBLIC WORKS ENGINEERING

CE 201:	Design of Metal Structures
CE 202:	Design of Reinforced Concrete Structures
CE 203:	Prestressed Concrete Structures
CE 206:	Foundation Engineering

* For Geology course descriptions, see the *Undergraduate and Graduate Catalogue*.

CE 208: Rock and Ice Mechanics
CE 211: Waste Water Treatment
CE 215: Urban Construction Technology
CE 216: Advanced Hydrology
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineering II
CE 220: Urban Transportation Engineering
CE 221: Pavement and Runway Design
CE 237: Advanced Sanitary Engineering Design
CE 242: Solid Waste Disposal
CE 243: Environmental Impact Assessment
CE 250: Advanced Metal Structures
CE 251: Advanced Reinforced Concrete Structures
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 255: Coastal Processes
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 276: Water Resources Planning and Control
EAd 204: Administration of Engineering Contracts
EAd 210: Engineering Law
EAd 241: Construction Management I
EAd 242: Construction Management II
EAd 243: Construction Management III
EAd 261: Economic Analysis in Engineering Planning

SOLID MECHANICS AND MATERIALS ENGINEERING

ApSc 211: Analytical Methods in Engineering I
ApSc 212: Analytical Methods in Engineering II
ApSc 213: Analytical Methods in Engineering III
ApSc 214: Analytical Methods in Engineering IV
ApSc 215: Analytical Methods in Engineering V
ApSc 216: Special Topics in Engineering Analysis
CE 207: Soil Dynamics
CE 208: Rock and Ice Mechanics
CE 209: Theoretical Soil Mechanics
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Engineering
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability
EngS 215: Advanced Strength of Materials
EngS 218: Introduction to Continuum Mechanics
EngS 221: Theory of Elasticity I
EngS 222: Theory of Elasticity II
EngS 229: Transformations in Materials
EngS 230: Deformation of Materials
EngS 231: Structure of Materials
*EngS 234: Composite Materials
EngS 236: Experimental Techniques in Materials Science
EngS 237: Environmental Effects on Materials I
EngS 238: Environmental Effects on Materials II
EngS 240: Fracture Mechanics
EngS 241: Fatigue and Failure of Materials

* Offered at NASA-Langley Research Center, may be offered on campus when arranged.

EngS 242:	Materials Recycling and Recovery
*EngS 249:	Special Topics in Materials Science
EngS 256:	Introduction to the Theories of Inelastic Media
EngS 284:	Numerical Methods in Engineering
EngS 285:	Finite Element Methods in Engineering Mechanics
EngS 288:	Advanced Finite Element Methods in Structural Mechanics
EngS 289:	Special Topics in Theoretical and Applied Mechanics
EngS 298:	Research
EngS 299–300:	Thesis Research
EngS 398:	Advanced Reading and Research
EngS 399:	Dissertation Research
ME 215:	Theory of Vibrations
ME 216:	Structural Dynamics
ME 221:	Intermediate Fluid Mechanics
ME 280:	Advanced Thermodynamics
ME 281:	Nonequilibrium Thermodynamics
ME 295:	Statistical Thermodynamics
ME 310:	Mechanics of Non-Newtonian Fluids

STRUCTURAL ENGINEERING (INCLUDING COMPUTER-ORIENTED ENGINEERING DESIGN)

ApSc 212:	Analytical Methods in Engineering II
ApSc 213:	Analytical Methods in Engineering III
ApSc 214:	Analytical Methods in Engineering IV
CE 201:	Design of Metal Structures
CE 202:	Design of Reinforced Concrete Structures
CE 203:	Prestressed Concrete Structures
CE 206:	Foundation Engineering
CE 210:	Methods of Structural Analysis
CE 215:	Urban Construction Technology
CE 250:	Advanced Metal Structures
CE 251:	Advanced Reinforced Concrete Structures
CE 252:	General Structural Dynamics
CE 253:	Failure and Reliability Analysis of Engineering Structures
CE 254:	Special Topics in Structural Engineering
CE 256:	Introduction to Ocean and Coastal Engineering
CE 257:	Harbor and Coastal Engineering I
CE 258:	Harbor and Coastal Engineering II
CE 261:	Analysis of Plates and Shells
CE 262:	Design of Plate and Shell Structures
CE 263:	Theory of Structural Stability
CE 298:	Research
CE 299–300:	Thesis Research
CE 398:	Advanced Reading and Research
CE 399:	Dissertation Research
EngS 215:	Advanced Strength of Materials
EngS 221:	Theory of Elasticity I
EngS 234:	Composite Materials
EngS 240:	Fracture Mechanics
EngS 241:	Fatigue and Failure of Materials
EngS 256:	Introduction to the Theories of Inelastic Media
EngS 282:	Computer-aided Design
EngS 283:	Application of Computer Graphics in Engineering
EngS 284:	Numerical Methods in Engineering

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

EngS 285: **Finite Element Methods in Engineering Mechanics**
EngS 288: Advanced Finite Element Methods in Structural Mechanics

STRUCTURES AND DYNAMICS*

ApSc 211: Analytical Methods in Engineering I
ApSc 212: Analytical Methods in Engineering II
ApSc 213: Analytical Methods in Engineering III
ApSc 214: Analytical Methods in Engineering IV
ApSc 215: Analytical Methods in Engineering V
ApSc 216: Special Topics in Engineering Analysis
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Engineering
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability
EE 157: Machine and Assembly Language Programming
EngS 221: Theory of Elasticity I
EngS 222: Theory of Elasticity II
EngS 234: Composite Materials
*EngS 281: Advanced Programming Techniques for Engineering Mechanics Problems
EngS 282: Computer-aided Design
EngS 283: Application of Computer Graphics in Engineering
EngS 284: Numerical Methods in Engineering
EngS 285: Finite Element Methods in Engineering Mechanics
*EngS 286: Analysis and Design of Thin-walled Structures
*EngS 287: Automated Design of Complex Structures
EngS 288: Advanced Finite Element Methods in Structural Mechanics
EngS 289: Special Topics in Theoretical and Applied Mechanics
EngS 299–300: Thesis Research
EngS 314: Advanced Numerical Methods in Engineering
EngS 398: Advanced Reading and Research
EngS 399: Dissertation Research
ME 215: Theory of Vibrations
ME 216: Structural Dynamics
ME 223: Aeroelasticity
*ME 248: Seminar: Aircraft Design I
OR 251: Linear Programming
OR 252: Nonlinear Programming

TRANSPORTATION ENGINEERING

Option I: Technology of the Vehicle

CE 201: Design of Metal Structures
CE 210: Methods of Structural Analysis
CE 220: Urban Transportation Engineering
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability
EngS 241: Fatigue and Failure of Materials
EngS 251–52: Transportation Workshop
EngS 260: Random Process Theory in Engineering
ME 215: Theory of Vibrations

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

ME 218:	Design of Floating and Submerged Marine Vehicles
ME 222:	Applied Fluid Dynamics
ME 223:	Aeroelasticity
ME 225:	Turbomachinery I
ME 226:	Turbomachinery II
ME 237:	Propulsion
ME 241:	Engineering Systems Design
ME 243:	Advanced Mechanical Engineering Design
ME 246:	Electromechanical Control Systems
ME 250:	Energy Systems Design
ME 255–56:	Urban Transportation Technology
ME 275:	Stability and Control of Vehicles
ME 286:	Special Topics in Mechanical Engineering
ME 298:	Research
ME 299–300:	Thesis Research
ME 398:	Advanced Reading and Research
ME 399:	Dissertation Research
*U&RP 208:	Urban Transportation Planning
*U&RP 209:	Urban Transportation Models

Option II: The Way (Route Structures and Facilities)

CE 201:	Design of Metal Structures
CE 202:	Design of Reinforced Concrete Structures
CE 203:	Prestressed Concrete Structures
CE 204:	Applied Soil Mechanics I
CE 205:	Applied Soil Mechanics II
CE 206:	Foundation Engineering
CE 207:	Soil Dynamics
CE 209:	Theoretical Soil Mechanics
CE 210:	Methods of Structural Analysis
CE 219:	Groundwater and Seepage
CE 220:	Urban Transportation Engineering
CE 221:	Pavement and Runway Design
CE 222:	Stations and Terminals
CE 223:	Traffic Engineering
CE 250:	Advanced Metal Structures
CE 251:	Advanced Reinforced Concrete Structures
CE 252:	General Structural Dynamics
CE 253:	Failure and Reliability Analysis of Engineering Structures
CE 255:	Coastal Processes
CE 256:	Introduction to Ocean and Coastal Engineering
CE 257:	Harbor and Coastal Engineering I
CE 258:	Harbor and Coastal Engineering II
EngS 240:	Fracture Mechanics
EngS 241:	Fatigue and Failure of Materials
EngS 251–52:	Transportation Workshop
EngS 298:	Research
EngS 299–300:	Thesis Research
EngS 398:	Advanced Reading and Research
EngS 399:	Dissertation Research
ME 255–56:	Urban Transportation Technology
OR 231:	Theory of Traffic Flow
*U&RP 208:	Urban Transportation Planning
*U&RP 209:	Urban Transportation Models

* For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Catalogue*

Option III: Transportation Systems*

CE 220:	Urban Transportation Engineering
CE 223:	Traffic Engineering
EAd 281–82:	Systems Analysis and Management
EngS 251–82:	Transportation Workshop
ME 255–56:	Urban Transportation Technology
ME 298:	Research
ME 299–300:	Thesis Research
OR 201:	Survey of Operations Research Methods I
OR 231:	Theory of Traffic Flow
OR 251:	Linear Programming
OR 252:	Nonlinear Programming
OR 271:	Forecasting Techniques
OR 273:	Digital Systems Simulation
OR 277:	Queuing Theory
†U&RP 201:	Introduction to Urban and Regional Planning
†U&RP 206:	Community Facilities Planning
†U&RP 208:	Urban Transportation Planning
†U&RP 209:	Urban Transportation Models

Civil Engineering Graduate Courses

201 Design of Metal Structures (3)

Structural behavior of metal structures, conception and design of advanced structural components and systems, hysteretic behavior, plastic design principles, box type girders, cable systems, composite girders, and special topics. Prerequisite: CE 191 or equivalent. (Spring)

202 Design of Reinforced Concrete Structures (3)

Structural behavior of reinforced concrete structures, conception and design of structural components, prestressed concrete, slabs, ultimate strength and deformation, box type girders, hysteretic behavior, safety considerations, and special topics. Prerequisite: CE 192 or equivalent. (Fall)

203 Prestressed Concrete Structures (3)

Structural behavior and failure modes of prestressed concrete structures; design in prestressed concrete, including long-span structures, bridges, and precast systems. Prerequisite: CE 202 or equivalent. (Spring)

204 Applied Soil Mechanics I (3)

Theories of soil strength; bearing capacity of shallow foundations and their design; deep foundations, including pile types and design criteria; theories of lateral earth pressure with applications; stability analyses of slopes. Selected experiments in the soil mechanics laboratory. Prerequisite: CE 168 or equivalent. (Spring)

205 Applied Soil Mechanics II (3)

Nature of soil, including geological and pedological aspects; flow of water in soil; seepage involving foundations, dams, and wells; stress distribution in earth masses; one- and three-dimensional theories of consoli-

* Prerequisite courses for admission to this option are ApSc 115 and Stat 191 (see the *Undergraduate and Graduate Catalogue*).

† For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Catalogue*.

dation; analysis of settlement. Selected experiments in the soil m
laboratory. Prerequisite: approval of Department. (Fall)

206 Foundation Engineering (3)

Principles of soil mechanics and structural mechanics applied
analysis and design of spread footings and mat foundations, pile
tions, retaining structures, including sheeting and bracing syste
waterfront structures. Problems associated with subsurface expl
dewatering excavations, and underpinning. Prerequisite: CE 204
or equivalent. (Spring)

207 Soil Dynamics (3)

Stress-strain behavior of soil under transient and repeated loads, ef
earthquakes upon foundations and earth dams, design of machiner
dations. Prerequisite: CE 204. (As arranged)

208 Rock and Ice Mechanics (3)

Classification, composition, and structure of rocks; elastic and rheol
properties; fracture; effect of hydrostatic pressure and temperature
of water; strain measurement and testing. Composition and struct
ice; deformation, flow and fracture. Engineering, geophysical, and
logical applications. Prerequisite: graduate status and approval o
partment. (As arranged)

209 Theoretical Soil Mechanics (3)

Advanced theories of consolidation. Yield condition in soils. Applic
of theories of plasticity in soil mechanics. Elements of wave propag
in soils, including surface waves. Prerequisite: ApSc 213, CE 204 or
(As arranged)

210 Methods of Structural Analysis (3)

Modern methods of analysis of statically indeterminate structures, in
analysis based on flexibility, stiffness, energy and variational methods
structuring techniques; consideration of plastic collapse of structures
troduction to the finite element method. Prerequisite: graduate st
(Fall)

211 Waste Water Treatment (3)

Characteristics of waste, some important pollution indicators, fo
mentals of biochemical engineering for waste control, physical unit op
tions, chemical and biological unit processes, design of treatment facil
Prerequisite: CE 197 or equivalent. (Fall)

215 Urban Construction Technology (3)

Precedents and contemporary trends in urban housing, building, and p
ning technology. Prerequisite: approval of Department. (Spring

216 Advanced Hydrology (3)

Precipitation, evaporation, and transpiration. Soil physics; stream g
drainage basins, hydrograph analysis, and stream-flow routing. Des
criteria, flood frequency statistics and analysis, flood forecasting and c
trol, water supply forecasting. Prerequisite: CE 195 or equivalent.
(Spring)

217 Water Resources Engineering I (3)

Hydrology; open-channel flow with application to navigation, irriga

water power; water supply and distribution. Prerequisite: ApSc 114, CE 193; or equivalent. (Fall)

218 **Water Resources Engineering II** (3)

Groundwater; pollution and sanitation in sewers, lakes, estuaries; water-resources planning; special problems. Prerequisite: CE 217 or equivalent. (Spring)

219 **Groundwater and Seepage** (3)

Permeability theory or groundwater flow, flownets, analogs, computer solutions; applications to engineering problems such as excavation dewatering, flow through dams, stabilization of earth slopes. Prerequisite: ApSc 211 and concurrent registration in ApSc 213. (Fall)

220 **Urban Transportation Engineering** (3)

Introduction to urban transportation planning. Analysis of urban transportation requirements. Evaluation procedure for the selection between alternative solutions. Prerequisite: approval of Department. (Fall)

221 **Pavement and Runway Design** (3)

Pavement types, wheel-load characteristics; stresses in pavements and subgrades; empirical methods of design of flexible and rigid highway and airfield pavements; general principles of runway design. Prerequisite: CE 202, CE 204 or CE 205. (Spring)

222 **Stations and Terminals** (3)

Unified treatment of the functions and operation of stations and terminals of transportation systems; emphasis on specifications and planning criteria. Problems of locating the facility, passenger and freight handling, intra-modal and inter-modal interfacing, communication and control. Illustrations include railroad and subway stations, bus terminals, airports, and harbors. Prerequisite: approval of Department. (Spring)

223 **Traffic Engineering** (3)

Lane capacity and other traffic system performance measures; methods of characterizing steady and unsteady traffic flow phenomena; traffic monitoring techniques, instruments, and data processing; bottleneck dynamics; traffic signalization; one-way street operation; reserved transit lanes; vehicle dynamics and road geometry; approaches to automatic control of unlimited space and limited-access road traffic systems. Prerequisite: approval of Department. (Fall)

237 **Advanced Sanitary Engineering Design** (3)

Basic principles and practical considerations; hydraulic and structural requirements; basic parameters and elements of design; layout and design of water supply and sewage systems, pumping stations, and wastewater treatment plants; development of design parameters; cost and financing; existing plant expansions. Prerequisite: graduate status. (Fall)

240 **Environmental Microbiology** (3)

Basic cellular organizations and processes related to waste treatment; microorganisms as disease carrying agents in natural and waste water; laboratory tests for coliform organisms and viruses, and analysis of activated sludge. (Fall)

241 **Environmental Chemistry** (3)

Chemical composition and chemical analysis of water; chemical treatment

of water and waste water; laboratory tests of solids, BOD, CO
phorus, nitrogen, etc., as related to water quality. (Spring)

242 **Solid Waste Disposal** (3)

Characteristics of solid waste; collection, transportation, and dispo
tices; regional planning and management; resource and energy
from solid waste. Prerequisite: approval of Department. (Fall

243 **Environmental Impact Assessment** (3)

Public policy and legislation at federal, state, and local levels co
quality of the environment. Strategies and methodologies which ha
developed to assess impact of engineering projects. Technology of
ing impact on air and water quality and on land use, applied to tr
tation facilities, water supply and pollution control facilities, and
trial and community development. Prerequisite: approval of Depa
(Fall)

250 **Advanced Metal Structures** (3)

Conception, analysis, and design of low-rise and high-rise buildings b
tic and inelastic methods, suspended roofs, earthquake considerations
unique structural systems. Prerequisite: CE 201 or equivalent.

251 **Advanced Reinforced Concrete Structures** (3)

Conception, analysis, and design of low-rise and high-rise buildings b
mate strength methods, precast systems, progressive collapse, earth
considerations, domes, folded plates, shell-type structures and special t
Prerequisite: CE 202 or equivalent. (Spring)

252 **General Structural Dynamics** (3)

Analysis of elastic structures under dynamic loadings—steady-state,
sient, and stochastic; vibrations of rigid frames, plates, and thin s
Stochastic load processes—wind, earthquake, sea; failure under stoc
loading—first exceedance, damage accumulation. Prerequisite: ApSc
CE 210; or equivalent and approval of Department. (Spring)

253 **Failure and Reliability Analysis of Engineering Structures** (3)

Operational and structural failure mechanisms; instability, fracture,
fatigue. Operational and structural safety, probability of failure. As
of probabilistic structural analysis, statistics of extremes, risk and relia
ty, optimal design criteria. Prerequisite: ApSc 115 or equivalent. (F

254 **Special Topics in Structural Engineering** (3)

Selected problems in structural mechanics and design: (1) thermal stre
in structural systems, (2) advanced probabilistic structural mechanics,
structural design for dynamic loads, (4) structural design for repe
loads, or (5) structural synthesis and optimization. May be repeated
credit. Prerequisite: CE 210 and approval of Department. Topic
announced in the *Schedule of Classes*. (As arranged)

255 **Coastal Processes** (3)

Longshore currents and nearshore circulation; coastal sediment pro
ties and analysis, longshore transport processes and rates; sediment tra
response of beaches to wave action and structures; tidal inlets, mechan
bypassing; beach nourishment; wind transport of sandy dune stabiliza
sediment tracing. Prerequisite: approval of Department. (Spring)

256 Introduction to Ocean and Coastal Engineering (3)

Application of wave mechanics to the analysis of wave motion in coastal and offshore regions: reflection, diffraction, refraction. Wave spectra: procurement of spectral data by direct measurement or from hind-casting techniques. Beaches and littoral drift, mixing processes, outfalls and intakes in the oceans and estuaries, wave forces on coastal and offshore structures, harbor oscillations, tides in estuaries. Prerequisite: ApSc 115, ME 221; or equivalent. (Fall)

257 Harbor and Coastal Engineering I (3)

Waves and swells, tides and currents, coastal regime, estuaries and deltas, structures for coastal protection, principles of harbor navigation, harbor planning and harbor design, breakwaters and sea walls, quays, docks, internal access structures; maintenance of external and internal access, dredging. Prerequisite: CE 256. (Spring)

258 Harbor and Coastal Engineering II (3)

Interaction between structures and waves. Analysis and design of flexible structures: piers, jetties, and protective structures; off-shore drilling platforms. Design criteria, moorings and cables, harbor operations equipment. Prerequisite: CE 252 or equivalent; CE 257. (Fall)

261 Analysis of Plates and Shells (3)

Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations, theory of folded plate structures. Theory of curved surfaces: general linear bending theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow shell theory. Specific applications. Prerequisite: graduate status. (Spring)

262 Design of Plate and Shell Structures (3)

Design of long-span plate and shell roof structures in reinforced concrete and metal; design of containers for fluids and granular materials; computer applications in the analysis of such structures. Prerequisite: CE 201, 202, 261; or equivalent. (Fall)

263 Theory of Structural Stability (3)

General criteria for stability; buckling of elastic and inelastic columns and frames; torsional and lateral buckling; variational methods Buckling of plates and shells under static loads; stability of stiffened structures; effect of imperfections and boundary conditions. Prerequisite: graduate status (Fall)

265 Special Topics in Geotechnical Engineering (3)

Selected topics such as rheology of soils, computer applications, excavation and tunneling, ocean engineering problems, or other special topics. May be repeated for credit. Prerequisite: approval of Department. (As arranged)

271 Theoretical Marine Hydromechanics (3)

Introductory course designed to acquaint the student with some physical concepts and mathematical tools of theoretical marine hydromechanics. Derivation of the fundamental equations and boundary conditions of a fluid media; application of potential-flow theory to fluid motion around two- and three-dimensional bodies; perturbation concepts. Introduction to thin-ship and slender-body theories. Derivation of force and movement of

bodies in calm and disturbed water. Prerequisite: approval of Dep
(As arranged)

272 Advanced Waste Treatment Process Design (3)
Pre-design considerations; application of kinetics to treatment pr
reactor types and flow characteristics; theory of continuous cultur
eral considerations of activated sludge processes for industrial was
ment; miscellaneous topics. Prerequisite: CE 211 or equivalent.

274 Mechanics of Water Waves (3)
Irrotational theory for deep- and shallow-water waves, reflexion,
tion, diffraction, attentuation. Water waves of finite amplitude:
water theory, tides, bores, long-waves theory, conoidal and solitary
Wave generation by wind, state-of-the-art based on correlation
theory and measurements. Wave-breaking and reflexion. Prereq
ME 221 or equivalent and permission of instructor. (Fall)

275 Special Topics in Ocean Engineering (3)
Selected topics: (1) marine aspects of viscous-flow theory, (2) inte
(internal) waves, (3) applied random processes in ocean and c
engineering, or (4) other selected topics. May be repeated for
Prerequisite: approval of Department. (Spring)

276 Water Resources Planning and Control (3)
The parameters of water resources planning and control; economi
water resources and related natural resources; economics of water q
control; physical parameters of water resource development; wate
sources law. Prerequisite: approval of Department. (Spring)

277 Industrial Waste Treatment (3)
The nature of industry and waste generation; industrial waste char
istics; waste measurements; techniques utilized in industrial waste
ment and control; nuclear waste control; reuse of industrial effluen
sewage for industrial process water; problems associated with treat
and disposal of industrial wastes and their effects on receiving wa
Prerequisite: CE 211 or equivalent. (Fall)

278 Pollution Transport System (3)
Distribution of pollutants in natural waters and atmosphere; diffusive
advective transport; mathematics for stream pollutant deoxygenat
rates; groundwater pollution transport; sediment transport; thermal
port; numerical simulation of pollutant transports in streams and e
aries. Prerequisite: CE 193, ME 131. (Fall)

298 Research (arr.)
Basic research projects, as arranged. May be repeated for credit.
and spring)

299–300 Thesis Research (3–3)
(Fall and spring)

398 Advanced Reading and Research (arr.)
Limited to students preparing for the Doctor of Science qualifying ex
nation. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)
Limited to Doctor of Science candidates. May be repeated for credi
(Fall and spring)

Mechanical Engineering Graduate Courses

204 **Advanced Instrumentation Techniques** (3)

Pressure and temperature sensors; shadowgraph, schlieren and interferometer systems; laser holography; laser doppler velocimetry; signal conditioning, use of amplifiers with shielding and grounding techniques; digital techniques; signal multiplexing; use of computers; error analysis and data handling. Lecture and laboratory. Prerequisite: approval of Department. (Fall)

215 **Theory of Vibrations** (3)

Damped and undamped natural vibrations, transient response and response to harmonic and periodic excitation, natural vibration of discrete and continuous systems; integral formulation of eigenvalue problems, response by modal analysis, approximate methods, influence of secondary effects and constraints, damped systems. Prerequisite: approval of Department. (Fall)

216 **Structural Dynamics** (3)

Methods of solving vibration problems: differential equation, Rayleigh-Ritz finite element. Free and forced vibration of structural components: straight, curved, and thin-walled beams; plates and shells; sandwich construction. Vibration of built-up structures. Structural wave motion, wave motion in periodic structures. Prerequisite: ME 215. (As arranged)

218 **Design of Floating and Submerged Marine Vehicles** (3)

Consideration of interaction between hydrodynamics, propulsion, and configuration aspects of design of floating structures and vehicles; effects of submergence and deep submergence; hydrofoil and vertical jet action; structural considerations. Prerequisite: EngS 228. (Fall)

221 **Intermediate Fluid Mechanics** (3)

The continuum, kinematics of fluids: stress tensor, strain and rate-of-strain tensor; fundamental equations of the flow of viscous compressible fluids; Laplace's equations; source, sink, and doublet; vortices, Biot-Savart theorem and the flow field of a vortex; spherical and cylindrical harmonics; methods of singularity distributions, complex-variable methods; laminar flow of viscous incompressible fluids; boundary-layer concept. Prerequisite: approval of Department. (Fall)

222 **Applied Fluid Dynamics** (3)

Subsonic lifting line wing theory, direct and inverse solution of the lifting surface theory; singularity method for wing-body combination; vortex lift theory; effects of camber and twist distribution; transonic airfoils, effect of wing sweep, area ruling concept; supersonic linearized wing theory; similarity rules. Prerequisite: ME 221 or equivalent. (Spring)

223 **Aeroelasticity** (3)

Introduction to aeroelastic phenomena; structural deformations of vehicles under static and dynamic loads; vibrations of vehicle structures; static aeroelastic problems (structural deformation, divergence, control effectiveness, and reversal); flutter theory and calculation of flutter boundaries; aerodynamics of steady and nonsteady two-dimensional wings in subsonic, sonic, and supersonic flow; strip theory applications of two-dimensional aerodynamics to three-dimensional lifting surfaces; piston theory and Newtonian-flow theory. Prerequisite: ME 215, 221; or equivalent. (Fall)

224 Fundamentals of Combustion Engines (3)

Classification of combustion engines: air cycles, vapor cycles, c combustion engines, internal combustion engines; rotary engines, cating engines, and turbomachinery; ideal cycle analysis; engine hea and friction; practical cycle analysis status of computerized cycle a combustion and knocking; carburetion and fuel injection; mixture c tion; valve mechanism; ignition systems; combustion chamber; pis gine, rotary-engine, and turbomachinery mechanics and balance. quisite: approval of Department. (Fall)

225 Turbomachinery I (3)

Review of thermodynamic principles; fundamentals of fluid flow; h lic power systems; steam and gas turbine cycles; turbine, compress pump types; energy interchange in fluid machinery; design and chara tics of turbines, compressors, and pumps; linking of compressor and pressor turbine characteristics; combustion systems; regenerators. requisite: approval of Department. (Fall)

226 Turbomachinery II (3)

Aerodynamics of aerofoils, flow in cascades, data for turbine ca tions, axial turbine aerodynamic design, performance of compressor cades, axial compressor aerodynamic design. Heat and mass transfe chemical reaction, combustion of liquid fuels, combustion in pre gases, combustion without premixing, gas-turbine combustion cha design. Prerequisite: ME 225. (Spring)

227 Viscous Flow (3)

Exact solutions of Navier-Stokes equations; the small Reynolds nu approximations, laminar boundary-layer theory and the techniques fo solution, stability of laminar flows; Reynolds theory of turbulent stre applications to internal and external flows, turbulent boundary-layer ory; applications to heat transfer problems; flow separation. Prerequ ApSc 213; ME 221 or equivalent. (Fall)

231 Hydrodynamics (3)

Flow at large Reynolds number: vorticity dynamics, Kelvin's theore inviscid flow, vorticity in motions generated from rest, boundary la applications of the momentum theorem. Irrotational flow theory: a cations of Bernoulli and momentum theorems to steady flows, flow ab a rigid body, two-dimensional motion and applications of complex var theory, free surface flows, Froude numbers, criterion of dynamic sim ity. Effectively inviscid flow with vorticity: sheet vortex, flow with v vortex system of a wing. Prerequisite: ME 221 or equivalent. (Spr

235 Compressible Flow (3)

Thermodynamics and physical properties of gases, fundamental equa of a compressible inviscid fluid, small perturbation theory, expansion Mach number and thickness parameters, second-order shock shapes, of entropy in supersonic flow, shock wave interactions, holograph in formation, Kármán-Tsien and other model gases, conical flows, tra flow theory, method of characteristics, rotational nonisentropic flows. requisite: ApSc 213; ME 221 or equivalent. (Spring)

237 Propulsion (3)

Basic concepts of propulsion: energy transformations in propulsive d gas dynamics of combustion, detonation processes; nonuniform

mixing; intakes, additive drag; mechanics of flow induction; drag and thrust generation; multiple-flow thrust generators; thrust recovery and augmentation; the propulsion spectrum. Illustrative examples will include propellers, turbojets, turbofans, ramjets, and rockets. Prerequisite: approval of Department. (Spring)

240 **Kinematic Synthesis** (3)

Determination of linkage proportions from prescribed input-output conditions for both path and function-generating mechanisms; critical comparison of graphical, analytical, and computer-oriented methods. Techniques are applied to the synthesis of various machines and computers. Prerequisite: approval of Department. (Spring)

241 **Engineering Systems Design** (3)

Principles of system design; interdisciplinary system simulation for mechanical, electrical, fluid, and thermal sciences; dynamic response of systems; mathematical model and analogy studies; optimization techniques with computer-aided solutions. Prerequisite: approval of Department. (Fall)

243 **Advanced Mechanical Engineering Design** (3)

Design of mechanical engineering systems, components, and equipment; requires the integration of engineering disciplines at an advanced level. Prerequisite: approval of Department. (Fall)

246 **Electromechanical Control Systems** (3)

System synthesis, compensation, and stabilization using Bode diagrams, root locus, etc.; linear and nonlinear characterization of mechanical, electromechanical, and electronic control components. Prerequisite: approval of Department. (Fall)

247 **Fluidics** (3)

Introduction of fluidic components and systems: behavior and modeling of bistable and proportional jet devices, vortex amplifiers and sensors, passive elements, transmission lines; system synthesis, coupling effects. Survey of current applications and research. Prerequisite: approval of Department. (Spring)

*248 **Seminar: Aircraft Design I** (3)

Problem of designing an aircraft to certain specifications Regulatory restraints and requirements, state-of-the-art limitations, computer-aided design, integration of aircraft components, economic considerations, and iterations to final configuration to obtain specified mission profile. Prerequisite: approval of Department. (As arranged)

*249 **Seminar: Aircraft Design II** (3)

Aircraft design in relation to prescribed mission requirements, different configurative concepts, detail design features. Estimation of weight, size, and power of an aircraft to satisfy mission specifications; design trade-offs and compromises. Emphasis on subsonic aircraft for steady cruising flight missions. Jet-powered and propeller-driven aircraft; supersonic cruising aircraft. Prerequisite: approval of Department. (Spring)

250 **Energy Systems Design** (3)

Consideration of energy and power requirements in design of engineering

* Offered at NASA Langley Research Center; may be offered on campus when arranged.

systems; development of optimization methods with computer-ai
tions; selected multidisciplinary problems. Prerequisite: approva
partment. (Spring)

255–56 **Urban Transportation Technology** (3–3)

Problems of headway and capacity for modern transit systems a
relationships to control systems, braking, station design, and syste
agement. Urban vehicle design, including propulsion systems, sus
steering and switching. System evaluation techniques for techno
formance and economic evaluation of new concepts. Prerequisite:
of Department. (Academic year)

259 **Solar Heating and Cooling Systems** (3)

Availability of solar energy, climatic data for solar heating and
System description, solar collector, thermal energy storage, auxil
ergy source; system performance requirements. Subsystems eval
collector performance analysis, collector fluid loop optimization,
energy storage requirements. System configurations and modeling,
system requirements. Estimation of the total life-cycle costs for s
solar heating and cooling systems. Architectural features and con
tions. Prerequisite: approval of Department. (Fall)

260 **Heating, Refrigeration, and Air Conditioning** (3)

Fluid flow and heat transfer; heating and cooling load calculations
of heating and cooling distribution systems; design and character
evaporator, condenser, expander, and compressor. Methods of ref
tion and air conditioning: vapor-compression refrigeration, abso
refrigeration, steam jet refrigeration, thermo-electric refrigeration
temperature refrigeration, heat pumps, basic air-standard cycles, reg
tive and bootstrap air cycles. Method of heating: warm-air, hot-
electric-resistance, and solar heating systems and heat pumps. Pre
site: approval of Department. (Spring)

261 **Fundamentals of Environmental Control I** (3)

Understanding environmental systems, water as natural resources, air
ecological limiting factor, man's inadvertent modification of weather
climate, solid wastes, noise, pesticides, and radiation, natural reso
utilization of terrestrial ecosystems, international cooperation, citize
ticipation, environmental needs. Prerequisite: approval of Depart
(Fall)

262 **Fundamentals of Environmental Control II** (3)

Directed field investigations; case studies and workshops to document
logical problems associated with power plants, power plant site selec
impoundments, and industrial discharges as they relate to the curren
tional Environmental Policy Act of 1970 and the anticipated future
tional policies. Prerequisite: ME 261 or equivalent. (Spring)

263 **Environmental Control Processes I** (3)

Control of particulates emissions: settling, filtration, cyclonic collection
collection, and electrostatic precipitation. Control of gaseous emissions
absorption, adsorption, incineration, and condensation. Design, operat
and current status of air-pollution control processes. Prerequisite: appr
of Department. (Spring)

264 **Environmental Control Processes II** (3)

Selected problems in the application of mechanical engineering scienc

the design of environmental control equipment, i.e., theory of vortex flow, design of vortex equipment for separation of solid and oil suspensions from water; mechanics of air bubbles in water, mechanical generation of air bubbles, design of turbine, jet diffuser, and porus diffuser for aeration systems; thermodynamics and kinetics of combustion, application of combustion theory to design of incineration systems for sludge and solid disposal; theory of mass transfer and its application to hyperfiltration systems. Prerequisite: ME 261, 262; or equivalent. (Fall)

265 **Air-pollution Meteorology** (3)

Weather and motion systems of atmosphere; ground- and upper-level air conditions; atmospheric stability and inversions; atmospheric turbulence and diffusion; urban and topographic effects upon meteorological parameters; effects of meteorological parameters upon transportation and diffusion of pollutants; meteorological factors in plant location, design, and operation, and in urban planning. Prerequisite: ME 221 or equivalent. (Fall)

266 **Experimental Methods for Environmental Control** (3)

Theory and reference methods for air pollutants analysis, instrumentation for air pollutants monitoring, sampling, and analysis; theory and devices for thermal environmental control systems. Guided laboratory projects and experiments. Prerequisite: ME 260, 261; or equivalent. (Spring)

*270 **Aerodynamics of Flight Vehicles** (3)

Aerodynamic loads on flight vehicles, interference effects, application of aerodynamic theory to aircraft design, studies of aircraft dynamics and performance. Prerequisite: ME 222 or equivalent. (Spring)

*271 **VTOL Aircraft Technology** (3)

Fundamental principles of VTOL aircraft; hovering performance based on momentum theory; analysis of jet-induced interference effects; transition aerodynamics; theoretical stability and control and correlation with flight data; ground-effect theory and experiment; handling qualities criteria; elements of instrument approach and landing problem. Prerequisite: approval of Department. (Spring)

*272 **STOL Aircraft Technology** (3)

Basic principles of propulsive-lift STOL aircraft; high-lift aerodynamics; theoretical low-speed stability and control; handling qualities simulation and flight studies; fundamentals of internally blown and externally blown concepts; analysis of the engine-out problem; aerodynamic ground effect theory and experiment; elements of quiet propulsive lift problem; analysis of static and dynamic loads with blown flaps. Prerequisite: approval of Department. (Fall)

*273 **Principles of Automatic Flight Control** (3)

Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of Department. (Fall)

*274 **Principles of Flight Guidance** (3)

Guidance requirements for atmospheric flight; implementation of guidance

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

systems using inertial and radio techniques in conjunction with
data processing. Prerequisite: ME 273. (Fall)

275 Stability and Control of Vehicles (3)

Derivation of equations of motion, Euler transformations and
cosines, stability derivatives and linearization of equations of mo
bility of linear systems with application to longitudinal and latera
ics, Laplace transform techniques and frequency response analy
requisite: approval of Department. (As arranged)

***276 Mechanics of Space Flight** (3)

First- and second-order Hamilton-Jacobi perturbation theory ap
artificial satellites, von Zeipel's methods, special and general pert
theories for third-body perturbations. Differential correction of o
weighted least squares and minimum variance techniques. Con
of various filtering techniques as applied to orbit determination a
space flight parameter estimation. Prerequisite: approval of Dep
(As arranged)

***277 Numerical Methods in Fluid Mechanics** (3)

Numerical solution of partial differential equations of fluid flow
difference techniques for viscous and inviscid flows; stability; met
characteristics; boundary conditions; applications in subsonic and
sonic flows. Prerequisite: ApSc 213, EngS 284; or equivalent.
ranged)

***278 Performance, Stability, and Control of Helicopters** (3)

Development of rotor blade theories; actuator disc, blade element,
theory. Hovering and climb performance, autorotation and forward
performance. Rotor system mechanics, flapping motion of articulat
semi-rigid rotors, blade motions in plane of rotation. General pe
ance and design considerations. Stability and control in hoverin
forward flight, damping in pitch and roll, static stability with spee
angle of attack. Prerequisite: ME 222, 275. (Spring)

***279 Special Topics in Flight Sciences** (3)

Current problems and methods in high angle of attack stability and
trol. Nonlinear aerodynamics in the angle of attack region abov
stall. Influence of aircraft design and nonlinear aerodynamics param
on the poststall stability and control of aircraft. Employment of s
experimental techniques and development of equations pertaining t
veloped spin and recovery characteristics. Prerequisite: ME 275 o
proval of Department. (Spring)

280 Advanced Thermodynamics (3)

Statistical significance of the entropy concept, conditions of equilibr
equilibrium of heterogeneous systems. Application of thermodyna
formalism to magnetic, electric, and solid systems; equilibrium of sy
gases; the Nernst postulate and the third law of thermodynamics.
requisite: graduate status. (Fall)

281 Nonequilibrium Thermodynamics (3)

Limitations of equilibrium thermodynamics, entropy production, phen
enological equations and linear laws; postulates of nonequilibrium t

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

modynamics, formulation of the equations of nonequilibrium systems, statistical foundations, stationary nonequilibrium states; selected applications. Prerequisite: ME 280. (Spring)

282 **Energy Technology** (3)

Energy supply and demand; consumption patterns. Interrelationship between energy, environmental, and economic conditions. Dynamic energy conversion systems, direct energy conversion systems, renewable and nonrenewable energy sources, synthesis of fuels, unconventional energy devices and sources, performance analysis. Prerequisite: approval of Department. (Spring)

283 **Nuclear Reactor Engineering I** (3)

World energy resources and the importance of fission energy; atomic and nuclear structure; nuclear fission and chain reaction; critical mass; nuclear reactor classification; history of reactor development; nuclear reactions and radiations; radioactive decay; radiation detection, hazards, and protection; neutron reactions; neutron diffusion and slowing down; the criticality condition; reflected reactors; homogeneous and heterogeneous reactor systems; transient reactor behavior and control; description of pressurized and boiling water reactors; other reactor systems. Environmental considerations; reactor safety. Prerequisite: approval of Department. (Fall)

284 **Nuclear Reactor Engineering II** (3)

Energy removal; reactor coolants; reactor thermal hydraulics, radiation damage and reactor materials problems; reactor fuels; shielding; mechanical and structural components; preliminary reactor design; fuel cycles; description of nuclear reactor systems; engineered safety systems; the economics of nuclear power. Prerequisite: ME 283. (Spring)

*285 **Reaction Kinetics** (3)

Theoretical aspects of kinetics of homogeneous and heterogenous reactions in gaseous and liquid systems. Prerequisite: ME 280. (Spring)

286 **Special Topics in Mechanical Engineering** (3)

Prerequisite: approval of Department. (As arranged)

287 **Heat Conduction** (3)

Conduction of heat through solid, liquid, and gaseous media; formulation and methods of analytical, numerical, and analog solutions; steady two- and three-dimensional problems, problems in unsteady heat conduction; conduction in composite regions. Prerequisite: ApSc 213 or equivalent. (Fall)

288 **Convective Heat and Mass Transfer** (3)

Heat and momentum transfer in laminar and turbulent flow; application of boundary-layer theory to problems of forced convection; the laminar boundary-layer and similarity solutions; heat convection in turbulent flow, momentum-heat transfer analogy; the influence of temperature-dependent fluid properties; convective heat transfer at high velocities; mass transfer; formulation of a simplified theory; some solutions to the conserved property equation. Prerequisite: ME 221 or equivalent. (Spring)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

289 Radiative Heat Transfer (3)

Nature of thermal radiation; radiative characteristics of surfaces; radiation within evacuated enclosures; configuration factors algeb tion methods for the integral equations of radiant interchange; e containing an absorbing and emitting medium; absorbing, emitt scattering media; combined radiation, conduction, and convectio requisite: ApSc 214 or equivalent. (Fall)

***290 Kinetic Theory of Gases (3)**

Equation of state and physical properties for gas composed of discr ticles; relation of kinetic theory to thermodynamics; Maxwell dist of molecular velocities; Boltzmann H theorem. Molecular inter free paths, collision rates, scattering coefficients. Introduction to di viscosity, heat conduction; imperfect gases; flow of gases at low Prerequisite: ME 280. (Spring)

291–92 Power Systems (3–3)

Design of thermal power system components and system optimi Steam cycle power generation system components: steam generato actor coolant system, condensate and feedwater system, turbine-gene waste heat removal. Heat balance studies, options for improved cyc ciencies, system optimization studies, component selection and cooling towers, lakes and ponds. Review of safety and pollution tions; testing, inspection, and codes. Survey of electric power system nology. Prerequisite: ME 148, 187; or equivalent. (Academic ye

293 Combustion (3)

Basic combustion phenomena. Rate processes and chemical kin Chain reaction theory. Detonation, deflagration, diffusion flames, ig geneous combustion. Combustion technology, computer modeling, experimental measurements. Impact of pollution regulations and alte fuels. Prerequisite: approval of Department. (Spring)

294 Wind Energy (3)

Technical and economic problems of energy extractions from wind. amination of the morphology of conversion devices; energy extrac from a moving fluid stream; aerodynamics of rotors. Nature of the w its special, temporal, and terrain-dependent variables. Structural, dyna and electrical problems and requirements; systems trade offs in wind bine design. A wind turbine will be designed. Prerequisite: approva Department. (Fall)

295 Statistical Thermodynamics (3)

Distribution functions; Boltzmann, Bose-Einstein, and Fermi-Dirac tistics; partition functions, correspondence between classical and statis thermodynamics. Systems with negligible effects of interparticle for perfect gases, perfect electron gas, photon gas. The Debye solid, Einstein solid. Prerequisite: ME 280. (Spring)

296 Special Topics in Heat and Mass Transfer (3)

Prerequisite: approval of Department. (As arranged)

297 Special Topics in Fluid Mechanics (3)

Prerequisite: approval of Department. (As arranged)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

298 **Research (arr.)**
Research as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research (3–3)**
(Fall and spring)

310 **Mechanics of Non-Newtonian Fluids (3)**
Classification of fluids; physical properties of composite fluids; convected coordinate systems; fundamentals of constitutive equations of composite fluids; purely viscous fluids, Reiner and Rivlin theories, power-law fluids; linear theory of viscoelastic fluids, Boltzmann principle, quasi-linear viscol elasticity; nonlinear theory of viscoelasticity, Rivlin-Ericksen theory; viscoplastic fluids, Bingham plastic fluids, Oldroyd's analysis; viscometry and rheogoneometry; turbulent flow of suspensions and emulsions in pipes; frictional drag reduction by polymeric additives. Prerequisite: approval of Department. (Fall)

311 **Nonsteady Flow (3)**
Fundamental equations of nonsteady viscous flow; frames of reference; Eulerian and Lagrangian methods. Boundary conditions; characteristics and waves, isentropic and nonisentropic disturbances; discontinuities, interactions, special transients. Piston theory and the oscillating airfoil. Nonsteady flows with viscosity and entropy gradients. Prerequisite: ME 235 or equivalent. (Fall)

312 **Theory of Turbulence (3)**
Concept of turbulence, theory of transition, stability, isotropic turbulence, free turbulence, turbulence shear flows, transport process in turbulent flow. Prerequisite: ME 227. (Fall)

315 **Hypersonic Flow (3)**
Small-disturbance theory, Newtonian theory; constant-density solution, theory of thin shock layers, flow over blunt bodies, hypersonic viscous flow. Prerequisite: ME 227. (Fall)

317 **Physical Gas Dynamics (3)**
Molecular and atomic phenomena in gases, intermolecular forces, specific heats, equation of state for a real gas, dynamics of dissociating gas, radiation. Prerequisite: ME 235; ME 295 or equivalent. (Spring)

398 **Advanced Reading and Research (arr.)**
Limited to students preparing for the Doctor of Science qualifying examnation. May be repeated for credit. (Fall and spring)

399 **Dissertation Research (arr.)**
Limited to Doctor of Science candidates. May be repeated for credit.
(Fall and spring)

Engineering Science Graduate Courses

201 **History of Technology I (3)**
The characteristic technologies of Prehistory, the Ancient Near East, Greece and Rome, Byzantium and Islam, and Christian Europe. Technology is broadly defined. Emphasis is on its manifold interactions with other cultural forces. (Fall)

*202 **Advanced General Metrology** (3)

Topics in the conceptual, physical, and mathematical aspects of me ment, standards, design for precision measurement and measurem extreme values. Prerequisite: graduate status. (Fall—evening

*203–4 **Probability and Statistics of Metrology** (3–3)

Probability distributions, discrete and continuous distributions; sa combinatorial analysis; stochastic processes; conditional probabilit relation; analysis of variance; design and analysis of experiments; Square experiments; factorial experiments; block and lattice desig requisite: ApSc 115 or equivalent. (Academic year—evening)

206 **Technology and Human Needs** (3)

Sociology of science and technology, the solar systems and earth. N tion, nonrenewable resources, renewable resources, energy, nuclea ergy, renewable energy conversion, environment, productivity, tran tion. Prerequisite: approval of Department. (Fall and spring

207 **Engineering Climatology** (3)

Constitution of physical properties of earth and atmosphere, stabili ditions, energy balance characteristics, atmospheric motions, storm casting models, tree-ring analysis, evaporation, precipitation, sn formation, soil moisture and ground frost. Prerequisite: approval partment. (As arranged)

208 **Energy Conservation** (3)

Methods of conserving energy without sacrificing productivity a quality of life. Conservation methods in the home, in transporta industrial, manufacturing, and commercial sectors. Second law d modynamics from a conservation viewpoint. Construction metho low-energy consumption in large and small edifices. Environmenta and low-fuel consumption in ground and air transportation. Green and natural fertilizers. Prerequisite: approval of Department. ranged)

210 **Quantitative Aspects of Social Phenomena** (3)

Mathematical models presenting social phenomena. Historical rev attempts to quantify social phenomena. Population growth, birt death rates; population diffusion; Lancaster equation; Richardso proach; the Forrester-Meadows model. Kinetic theory formulat peaceful co-existence. Probability distributions, characteristic fu and central limit theorem. Brownian motion approach to speculat the stock market. Traffic flow, the statistical approach and Lit method. Quality-of-life indicators and quantification of social ind Environmental modeling. Thermodynamics approach to self-rejuv systems and its application in government and organizations. Prere approval of Department. (As arranged)

212 **Nonrenewable Resources** (3)

Interplay of geology, engineering, and economics on resources. I resources in society, concepts and definitions for analyzing resource Mineral commodities, their world distribution, geology, productio nologies and costs, transportation systems, consumption patterns, tutes, recycling. Environmental impacts, energy requirements, and problems in mineral conservation; the threat of mineral

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

Analysis of optimistic and pessimistic forecasts of future resource depletion. Prerequisite: approval of Department. (As arranged)

213 **Renewable Resources** (3)

Food and fiber, solar energy and radiation, photosynthesis. Agricultural and forest biomass production, seasonal availability, collection and replanting. Substitution of renewable resources for depletable. Food-energy relationship. Biological and chemical conversion processes, direct combustion, pyrolysis, enzymatic hydrolysis, and hydrogenation. Economics of scale and life cycle cost of conversion systems. Environmental and socio-economic impacts of alternative land usage. Institutional barriers. Prerequisite: approval of Department. (As arranged)

214 **Geothermal Energy** (3)

Geothermal energy due to thermal gradients in the earth, fundamentals of geological gradients, geographic location of potential geothermal energy sources, comparison of methods of exploration and study of steam and hot rock systems. Generation of electricity from geothermal sources. Obtaining hot water process heat. Equipment design. Environmental effects and means of mitigating adverse conditions. Prerequisite: approval of Department. (As arranged)

215 **Advanced Strength of Materials** (3)

Advanced problems of stress and strength analysis of structural and machine elements: bending, torsion and buckling of thin-walled structures. Curved beams, stress-concentrations, thermal stresses, creep instability and stress relaxation, contact problems, composite elements. Prerequisite: CE 120 or equivalent. (Spring)

*217 **Analytical Mechanics** (3)

Fundamental principles, generalized coordinates, variational principles and Lagrange's equations, nonholonomic systems, Hamilton's equations, theory of small oscillations. Prerequisite: approval of Department. (Spring)

218 **Introduction to Continuum Mechanics** (3)

Kinematics of a continuum, equations of motion, linear isotropic elastic solid, Newtonian viscous fluid, integral formulation of general principles, simple applications. Prerequisite: approval of Department. (Fall)

221 **Theory of Elasticity I** (3)

Introduction to Cartesian tensor analysis; deformation, stress, linear constitutive relations, formulation of boundary value problems, variational principles; torsion and bending of prisimatical rods, plane problems in elastostatics. Prerequisite: approval of Department. (Fall)

222 **Theory of Elasticity II** (3)

Application of integral transforms and analytic function theory to solution of plane problems in static and dynamic elasticity. Introduction to three-dimensional elastostatics. Prerequisite: EngS 221, ApSc 211. (Spring)

228 **Physical Oceanography** (3)

Seawater, equations of motion, interaction between air and sea, currents, wind-waves in deep and shallow waters, long ocean waves, tides, wave-statistics, sea ice. Prerequisite: ME 221 or equivalent. (Spring)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

229 Transformations in Materials (3)

Thermodynamics of solids, statistical interpretation of entropy, f
fects, equilibrium in multicomponent systems, rate theory, diffusi
transformations, nucleation and growth, precipitation, martensi
formations. Prerequisite: approval of Department. (Spring, o

230 Deformation of Materials (3)

Dislocation geometry, stress field of dislocations, forces on a dis
dislocation reactions, dislocation dynamics, yield, plastic flow, wo
ening, recovery, solid solution hardening, precipitation and di
hardening, mechanisms of creep, yield and fracture. Prerequisite: a
of Department. (Fall, odd years)

231 Structure of Materials (3)

(Formerly Solid State for Engineers)

Space lattices, crystal structures, planes, directions, anisotropy,
and preferred orientations, stereographic projections, Bragg's law
techniques, moving crystal diffraction, Debye-Scherrer method,
spectrometry, electron microscopy, bonding energy of crystals, lat
ergy, lattice vibrations, free electron theory, zone theory, alloy th
conductors, insulators and semiconductors, magnetism, resistivity,
in metals. Prerequisite: approval of Department. (Fall, even ye

234 Composite Materials (3)

Principles of composites and composite reinforcement; micromec
and failure; interface reactions in various composites; reinforcing
rials; structure of composites—fiber-reinforced polymers, filler-rein
polymers, fiber-reinforced metals, directionally solidified alloys, disp
strengthened metals. Prerequisite: approval of Department. (S

***236 Experimental Techniques in Materials Science (3)**

Sample preparation. Optical microscopy including polarized light mi
phase contrast, interferometry. X-ray microscopy including Laue
nique and Debye-Scherrer method. Electron probe microanalysis
tron microscopy including electron optics, image formation and co
for scanning and transmission electron microscopy. Field ion micros
Prerequisite: approval of Department. (As arranged)

237 Environmental Effects on Materials I (3)

(Formerly Quantum Mechanical Treatment of Metals)

Aqueous corrosion, electrochemistry, electrochemical reactions, pola
tion, environmental factors, integranular corrosion, stress corrosion
temperature corrosion, kinetics and mechanisms of corrosion, oxida
liquid metal corrosion, irradiation effects. Prerequisite: approval of
partment. (Fall, even years)

238 Environmental Effects on Materials II (3)

Corrosion problems in systems such as coal and oil-fired energy pl
fission and fusion reactors, gas turbines. Prerequisite: EngS 235.
(Spring, odd years)

***239 Physical Ceramics (3)**

Crystal chemistry and the systematic study of the structure of cera
materials; solid reactions occurring at elevated temperatures; sinte

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

vitrification, diffusional mechanisms and effects; reaction rate theory; elastic, anelastic, and plastic properties of ionic and covalent solids; viscoelastic behavior of vitreous and vitreous-solid systems; phase equilibria of ceramic systems. Prerequisite: approval of Department. (Spring)

240 **Fracture Mechanics** (3)

Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture, linear elastic systems, plasticity considerations, fracture toughness, engineering analysis, notch strength analysis with limit approach, crack propagation laws, fatigue, fracture testing, comparison of recent continuum theories. Prerequisite: approval of Department. (Spring)

241 **Fatigue and Failure of Materials** (3)

Extreme environments: oxidation, corrosion, high temperature creep; fatigue: cyclic hardening and softening, crack initiation and propagation, statistical analysis of strength. Prerequisite: approval of Department. (Fall)

242 **Materials Recycling and Recovery** (3)

Techniques and technologies for recovering and reusing waste materials and developing low-resource waste systems. Direct relationships of recycling and waste reduction to energy conservation. Effect of recycling on energy and environmental impacts of alternative materials and products; legal, economic, institutional, and environmental policy aspects of recycling and waste reduction. Prerequisite: approval of Department. (As arranged)

*249 **Special Topics in Materials Science** (3)

Prerequisite: approval of Department. (As arranged)

251–252 **Transportation Workshop** (3–3)
(Formerly Transportation)

Students and staff from various disciplines are brought together for study of a selected transportation topic, or for study of the land-use objectives and transportation needs of a selected urban area and a survey of pertinent information and applicable solutions. Prerequisite: approval of Department. (Academic year)

253 **Control of Automated Transit Networks** (3)

Automatic traffic control techniques for automated transportation systems including rail rapid transit, group rapid transit, and personal rapid transit systems; extension of road traffic characterizations to automated systems; operating policies for automatically controlled vehicles; implementation of vehicle control systems for various headways; merging traffic control vehicle dispatching and routing strategies for automated transit networks; examples of current system technologies. Prerequisite: approval of Department. (Spring)

256 **Introduction to the Theories of Inelastic Media** (3)

Physical basis of anelasticity, viscoelasticity, plasticity, and viscoplasticity; constitutive equations of elastic and viscoelastic media; foundations of the theories of plasticity and viscoplasticity; boundary-value problems and wave propagation in inelastic media. Prerequisite: ApSc 213 or equivalent and approval of Department. (Spring)

*Held at NASA-Langley Research Center; may be offered on campus when arranged.

260 **Random Process Theory in Engineering** (3)

Spectral analysis, linear system, the superposition principle; stati
diction and probability function, Rayleigh distribution and its p
threshold crossing problems, prediction of extreme values; stati
diction of random vibration, application to civil and mechanical
ing. Prerequisite: ApSc 115 or equivalent. (Fall)

*263 **Atmospheric Physics for Engineers I** (3)

Atmospheric radiation: phenomenological equation of transfer;
to the transfer equation; optical, physical, and chemical properti
mospheric constituents; remote sensing and the direct inversion
energy transfer and atmospheric structure. Prerequisite: approva
partment. (As arranged)

*264 **Atmospheric Physics for Engineers II** (3)

Atmospheric dynamics: mean structure of the atmosphere, tem
pressure, and wind fields; mass, momentum, and energy transfe
scale features of atmospheric circulation; regional features of atm
circulation; micrometerology. Prerequisite: approval of Departme
(As arranged)

270 **Introduction to Acoustics** (3)

Waves in an infinite homogeneous medium; sound transmission
media and through structure, source, and dipole fields; sound proj
in ducts and enclosures; sound propagation through atmosphere an
tic absorptions, acoustic circuit elements; acoustic transducers; intro
to acoustic measurements. Prerequisite: approval of Departme
(As arranged)

*271 **Random Process Theory I** (3)

Random processes; stationarity and ergodicity; mean-square calculu
and cross-correlations and spectra; random processes in linear
mean-square estimation, prediction and filtering; zero and level cr
and peak distributions; applications in aerospace sciences. Prere
EngS 203 or approval of Department. (As arranged)

*272 **Random Process Theory II** (3)

Discrete and continuous state Markov-processes; chains, queues,
sion, and passage problems; linear and nonlinear estimation and sto
control; estimation of correlations and power spectra; applications i
munication theory; scattering from random surfaces; stochastic lin
tion and stability. Prerequisite: EngS 271. (As arranged)

*273 **Time Series Analysis** (3)

Harmonic analysis of deterministic and random signals; auto- and
correlations and spectra; periodogram, Blackman-Tukey and direct
ing methods of spectral estimation; effects of finite length and digiti
variability; coherence. Fast Fourier transform techniques; applicati
modern technology. Prerequisite: EngS 271 or approval of Depart
(As arranged)

274 **Noise and Vibration Control** (3)

Introduction to the physical effects of noise and vibration on man, f
cal sources of noise and their control; building noise, ventilation s

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. Prerequisite: EngS 270, ME 215. (As arranged)

*275 **Advanced Theoretical Acoustics** (3)

Acoustic wave motion, several methods of solving inhomogeneous wave equation, theory of sources, scattering and diffraction, duct propagation, introduction to acoustically coupled systems, acoustics in moving media. Prerequisite: ApSc 213, EngS 270. (As arranged)

*276 **Acoustical and Mechanical Measurements** (3)

Characteristics of signals, basic transducer elements, standards of measurements and calibrations, signal recording and processing, acoustical and vibration instrumentation, vibration exciters, vibration testing techniques, flow mechanical measurements. Prerequisite: EngS 270, ME 215. (As arranged)

*277 **Physical Acoustics** (3)

Concepts of continuum mechanics and thermodynamics, wave propagation in real media, thermal viscous and relaxational attenuations, piezoelectric crystals and ultrasonics, wave propagation in rigid and deformable porous media. Prerequisite: EngS 275. (As arranged)

*278 **Psychological and Physiological Acoustics** (3)

Auditory system and its response to sound, experimental methodology in psychoacoustics, subjective response to sound, environmental noise and its evaluation, criteria for the prediction of noise nuisance, nonauditory system response to noise. Prerequisite: approval of Department. (As arranged)

*279 **Human Factors in Engineering** (3)

Man-machine interface, effects of physical stresses on human behavior and performance, life support system, learning and conditioning of physical stresses. (Spring)

*280 **Special Topics in Acoustics** (3)

Current methods and problems in acoustics. Topics chosen from such areas as aerospace noise generation and control; instruments and procedures for acoustics measurements; and responses of structures, people, and communities to noise. Prerequisite: approval of Department. (As arranged)

*281 **Advanced Programming Techniques for Engineering Mechanics Problems** (3)

Techniques for efficient construction of large computer programs for engineering systems with emphasis on fundamental structured programming principles. Application to engineering mechanics systems such as finite elements and structural optimization. Effects of CPU organization and other hardware features of computer systems at NASA-Langley on numerical computations involved in engineering systems. Organization and management of data bases for large engineering mechanics systems. Prerequisite: approval of Department. (Spring)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

282 **Computer-aided Design** (3)

Fundamental concepts in the development of computational al for the design of structures, machine component and assemb other engineering systems. Representation of the design process sign specifications as a network of decision tables and logical fl timization techniques and algorithms in design applications. In computer-aided design methods based on the use of remote acc puter terminals. General purpose computer programs for en analysis and design. Students, individually or in groups, are req develop a small-scale general-purpose design program in an app area such as structural design, machine design, urban planning, mental quality control, etc. Prerequisite: EE 51 or equivalent, C equivalent, and approval of Department. (Fall)

283 **Application of Computer Graphics in Engineering** (3)

Curve-fitting techniques as applied to computer graphics; construct library of geometric lines and curves connecting a series of discrete Representation of two- and three-dimensional geometrical shapes of discrete points. Automatic generation and display on CRT s geometrical shapes consisting of a grid of discrete points interco by user-selected geometric shapes. Automatic mesh generation, t mations, projections, and the concept of "hidden" lines. Use of computer terminals and graphic plotter equipment in interactive co graphics applications. Prerequisite: EE 51 or equivalent, EngS equivalent. (Spring)

284 **Numerical Methods in Engineering** (3)

Review of programming fundamentals; matrix operations and solu simultaneous equations; difference methods and computer solution dinary and elliptic partial differential equations; numerical solution tial and boundary-value problems in heat transfer, fluid flow, and tural mechanics. Prerequisite: approval of Department. (Fall)

285 **Finite Element Methods in Engineering Mechanics** (3)

Formulation of the finite element method through variational pri for structural and continuum mechanics problems. Plane stress, strain, three-dimensional elasticity, plate bending, thermal conductio potential flow. Techniques of constructing and assembling charac elemental matrices, computer implementation of the finite element m Prerequisite: approval of Department. (Spring)

*286 **Analysis and Design of Thin-walled Structures** (3)

Statics of thin-walled beams and panels, force interplay between s ers and skin in the analysis and design of stiffened thin-walled struc strength and stiffness of locally buckled stiffened structures; classic of loads and safety factors; different considerations governing the of thin-walled structures; critical evaluation of various structural procedures. Prerequisite: approval of Department. (As arrange

*287 **Automated Design of Complex Structures** (3)

Review of techniques for automated design including mathematica gramming, fully stressed design, and optimality criteria; applicati automated design techniques to stiffened and composite shell-type tures; multiple-load conditions and design constraints. Prerequisite proval of Department. (As arranged)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

288 **Advanced Finite Element Methods in Structural Mechanics** (3)

Formulation of various finite element models in solid mechanics. Examination of errors, convergence characteristics. Application to nonlinear and dynamic problems including large deflection, stability, and inelastic problems. Recent developments of finite element methods. Prerequisite: EngS 285. (As arranged)

289 **Special Topics in Theoretical and Applied Mechanics** (3)

Introduction to nonlinear mechanics of continua. Polar decomposition, invariance, isotropy, representation theorems for invariants and isotropic tensor functions; deformation, kinematics, stress, balance principles; principles for constitutive relations, applications to nonlinear elasticity and non-Newtonian fluids. Prerequisite: ApSc 212. (Spring)

298 **Research** (arr.)

Basic research projects as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

*310 **Aeroacoustics** (3)

General theory of aerodynamic sound generation and propagation, Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise, boundary layer noise, fan and compressor noise, helicopter noise, sonic booms. Current problems in aeroacoustics. Prerequisite: EngS 275. (As arranged)

*311 **Nonlinear Acoustics** (3)

Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing walls. Prerequisite: approval of Department. (As arranged)

*312 **Theory of Random Vibration** (3)

Response of linear systems to stationary random inputs. Failures resulting from dynamic response. Response of space vehicle structures to intense noise fields, measurement, and application. Prerequisite: EngS 271, ME 215. (As arranged)

*313 **Structural Acoustic Interaction** (3)

Coupled response of structures to sound, system of infinite extent, system of finite extent, sound radiation from structure, sound transmission through structure. Panel response to turbulent boundary-layer excitation. Sound radiation from mechanically excited structure vibration. Prerequisite: EngS 270, 312. (As arranged)

314 **Advanced Numerical Methods in Engineering** (3)

Advanced methods for numerical solution to engineering problems: finite difference solutions to elliptic, parabolic, and hyperbolic equations, method of characteristics, stability of initial value methods, numerical solutions to integral equations, optimization and mathematical programming methods, selected topics for fourth-generation computers. Prerequisite: EngS 284, ApSc 213. (Spring)

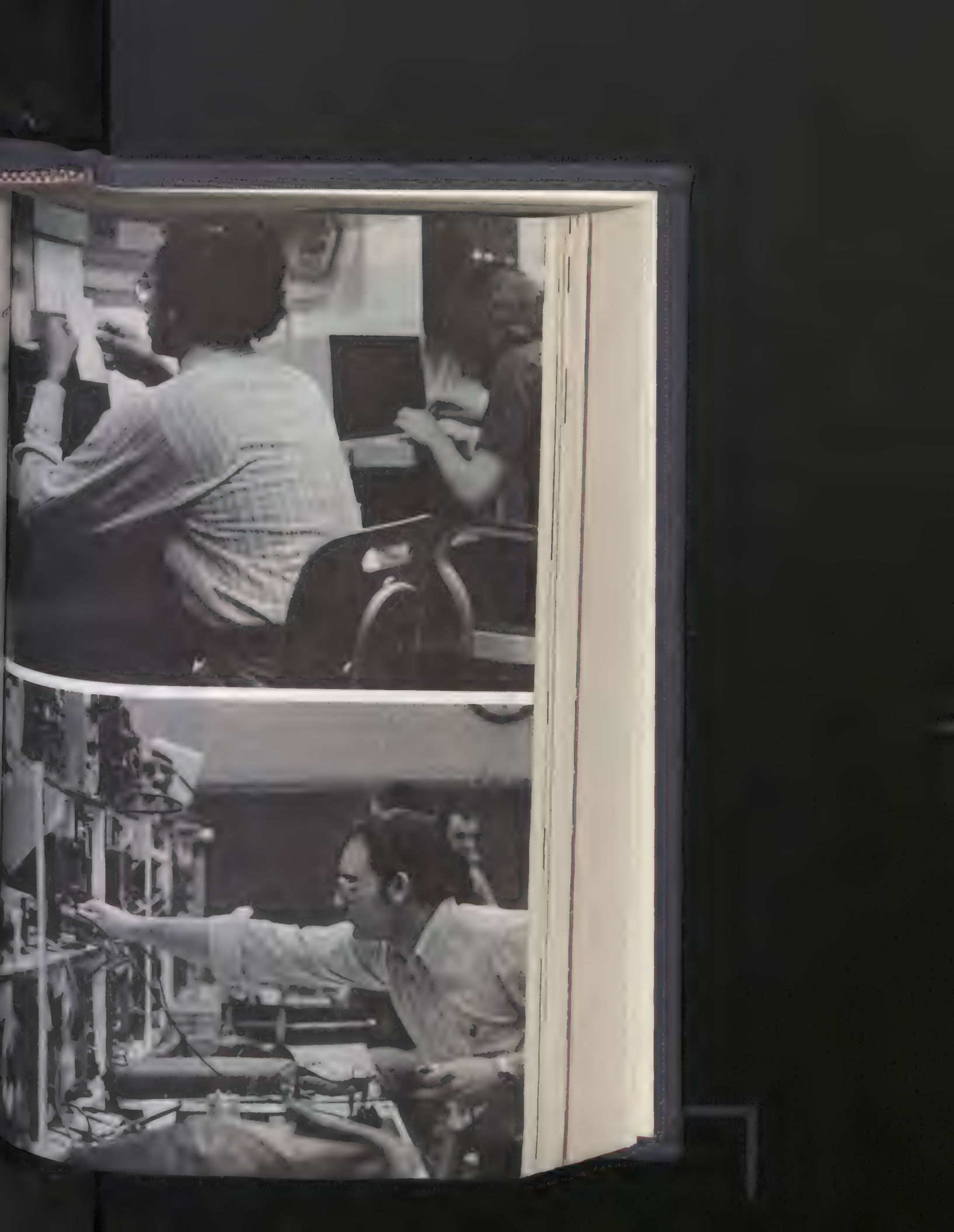
* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

398 **Advanced Reading and Research** (arr.)

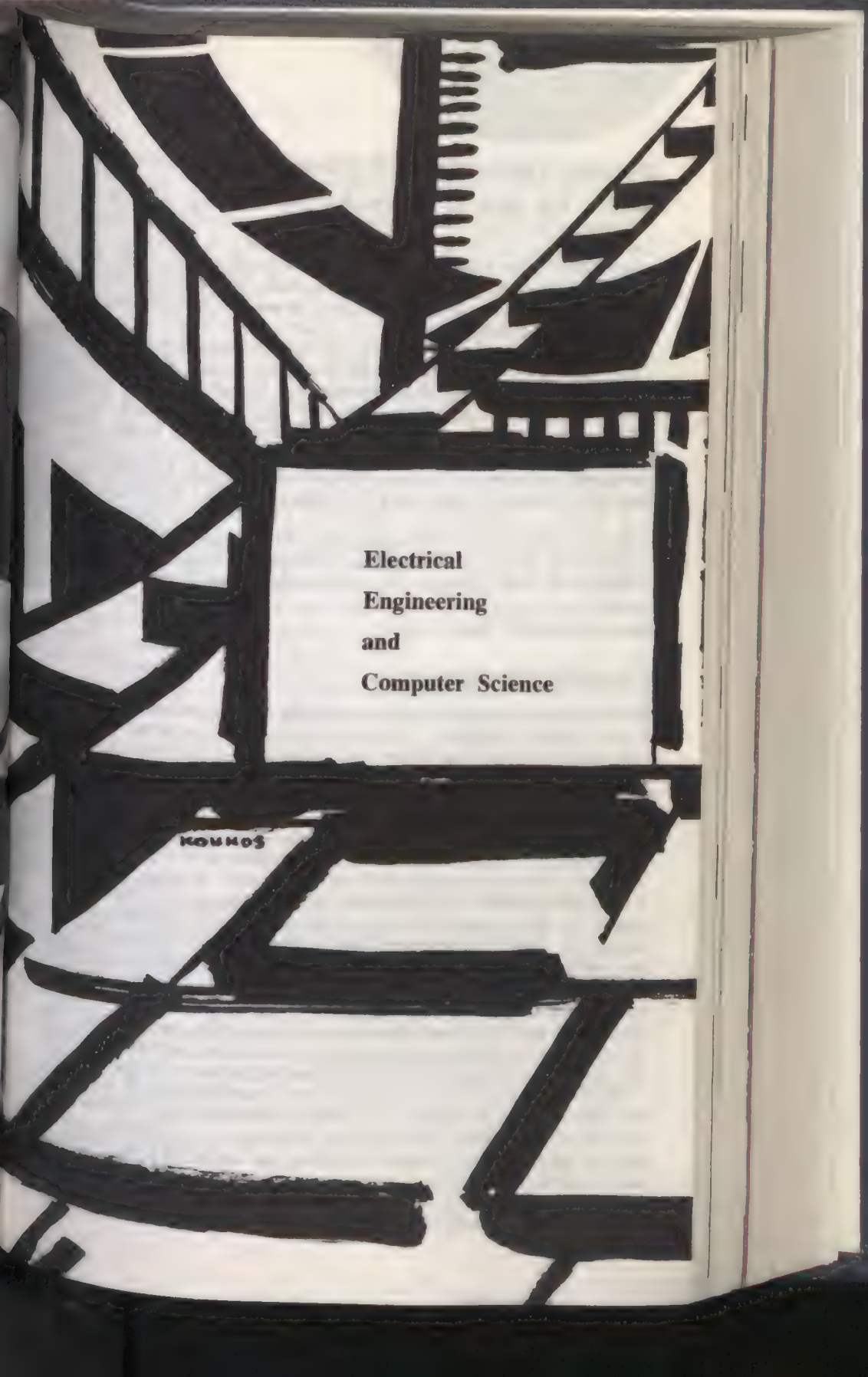
Limited to students preparing for the Doctor of Science qualifyin
nation. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated fo
(Fall and spring)






Electrical
Engineering
and
Computer Science
KOUNOS

Electrical Engineering and Computer Science

Professors R.B. Heller, W.K. Kahn, R. Pickholtz, H. Van Trees *(Visi*
Meltzer *(Chairman)*, M. Eisenberg, W. Chou *(Research)* G. Rapp
search)
Adjunct Professors F.K. Harris, C. Feldman, E. Weber, J. Pasta, E.
Professorial Lecturers W.F. Croswell, S.J. Raff, J.F. Halldane, G. Hi
Associate Professors E.H. Braun, N. Kyriakopoulos, R.H. Lang, W.D.
A. Abd-alla, H.J. Helgert
Associate Professorial Lecturers C.L. Fricke, W. Wasylkiwskyj, B.M.
L. Schuchman, A.R. Shulman, W.H. Carter, A. Das, R.H. Thomp
Martin, J.W. Schwartz, R.L. Stermer, Jr., D.S. Arnstein, L. Hope
J.W. Benoit, C.S. Maiorana, R.E. Merwin, R.D. Shults, L.A. R
Schneider, J.G. Adler, W.T. Bisignani, G. Frenkel, J.A. Knight, M.
T. Nieh, D.C. Rohlfs, N.A. Sloan
Assistant Professors T. Lee, R.S. Brice *(Research)*, M.B. Feldman
Assistant Professorial Lecturers J.L. Wolfgang, Jr., W.J. English, G.W.
R. Khatri, J.J. Salasin, R.E. Schneider, J.W. Woods, W.A. MacDon
Bisaga, F.D. Moore, E.S. Armstrong, J.E. Hogge, J.M. Russell
Swift, J.H. Tucker, C.E. Dunham, I. Haber, P.J. Nahin, R.C. Reyno
Bergstrom, R.M. Zeskind, J.C.L. Lane, D.H. Pugh II, H.E. Lee, J.N
smith
Special Lecturer P. Bock

UNDERGRADUATE STUDY

Electrical engineering as an engineering discipline is concerned with ma
a knowledge of electricity. Electrical engineers design generators, whic
vide electrical energy for homes and factories, and transmission networ
the motors which utilize this power to drive machinery. By developing
magnetic radiation, electrical engineers produce radio waves for the propa
of radio and television signals and the transmission of information via sa
Electrical engineers design and develop electronic circuits used in comm
tions equipment and computers. These machines have enhanced our th
and computational capabilities to permit mankind to solve some of its
complicated problems. Microminiaturization of electronic components ha
mitted the development of handheld calculators and portable communi
equipment. Electrical engineers are developing new instrumentation to
the medical profession in understanding the causes of disease and to aid i
serving and prolonging life. The production of electricity from nuclear f
and control of nuclear power plants is of growing concern to electrical
neers. The world's primary energy sources are limited, and electrical powe
become an even more important resource. Electrical engineers are involv
the research to produce electrical energy directly from solar power.

Engineering is a broad profession. Its responsibilities and activities e
into every aspect of industry and research and into many fields of comm
and the arts. Electrical engineers face problems in the production and dist
tion of manufactured products, including the design of electrical equipm
and of plants in which such products are made; in the design and construc
of electronic equipment for control, guidance, and communication; in the
eration of transportation systems; in pollution control; in the generation

transmission of power; in the modern phases of communication; in the control of traffic; in medical engineering; and in the extensive and sophisticated use of digital and analog computers in data processing and the design and control of systems.

Electrical engineering is a branch of engineering in which practical as well as theoretical and scientific aspects are integrated into a well-balanced discipline. Basic sciences such as physics and mathematics form the roots on which electrical engineering builds to create an applied science and to develop problem-solving techniques. Analysis, synthesis, and design go hand in hand. The electrical engineering curriculum provides the student with such an integrated approach. The first two years of the curriculum are common to all undergraduate fields in the School and develop a sound foundation of basic sciences coupled with engineering sciences. The third year continues with engineering sciences and begins an in-depth study of electrical engineering. The fourth year is devoted totally to electrical engineering. At the fourth year the student has a choice of following either the regular electrical engineering curriculum or branching off into an area of concentration in computer science or in pre-medical engineering.

The Department of Electrical Engineering and Computer Science has recently acquired modern laboratory equipment, including its own computer. The student has an opportunity during the last year to work on individual projects where ingenuity, coupled with faculty advice and guidance, allows concentration in areas such as computers, communications, microwaves, controls, electronics, medical engineering, and circuits.

Course schedules have been arranged to accommodate the full-time, the part-time and the co-op student. Undergraduate courses are offered once a year during the day for full-time students, and once every two years in the evening for part-time students.

Subject Areas

COMMUNICATIONS

EE 143: Elements of Communication Engineering I
EE 144: Elements of Communication Engineering II

COMPUTER SCIENCE

CSci 51: Applications of Computers
CSci 52: Computers and Societal Problems
CSci 152: Introduction to Digital Computers
CSci 153: Design of Switching Systems
CSci 154: Digital Computer Design
CSci 155: Introduction to Numerical Methods for Computers
CSci 156: Introduction to Systems Programming
CSci 157: Machine and Assembly Language Programming
CSci 158: Algorithmic Methods and High-level Languages
CSci 159: Programming and Data Structures
CSci 161–62: Computer Science Laboratory

CONTROLS AND SYSTEMS

EE 172: Control Systems
EE 177: Electrical Energy Conversion
EE 178: Electrical Power Systems

ELECTRONICS

EE 20:	Introductory Engineering Electronics
EE 121:	Engineering Electronics and Design
EE 122:	Pulse and Waveshaping Electronic Design
EE 124:	Electronic Devices

FIELDS AND WAVES

EE 31:	Fields and Waves I
EE 32:	Fields and Waves II
EE 133:	Electromagnetic Waves

LABORATORIES AND MEASUREMENT

EE 60:	Introductory Electrical Engineering Laboratory I
EE 61:	Introductory Electrical Engineering Laboratory II
EE 160:	Electrical Measurements and Instrumentation
EE 161–62:	Electrical Engineering Laboratory
EE 165:	Senior Design Project

MEDICAL ENGINEERING

EE 184:	Introduction to Medical Engineering

NETWORKS

EE 11:	Linear Networks I
EE 12:	Linear Networks II
EE 113:	Network Analysis and Design
EE 116:	Introduction to Network Synthesis

Core Curriculum

Normally the first four semesters are common to all undergraduate fields in the School of Engineering and Applied Science.

First Semester

EE 51:	Applications of Computers (3)
Math 30:	Precalculus (3)
Math 31:	Calculus of One Variable (3)
Phys 3:	Foundations of Physics (3)
Elective:	Selected from humanities or social sciences (3)

Second Semester

EE 52:	Computers and Societal Problems (3)
Engl 9 or 10:	English Composition: Language as Communication (3)
Math 32:	Calculus of Several Variables (3)
Phys 14:	Introductory Mechanics and Thermal Physics (3)
Elective:	Selected from humanities or social sciences (3)

Third Semester

ApSc 57:	Analytical Mechanics I (2)

ApSc 113: Engineering Analysis I (3)
ApSc 115: Engineering Analysis III (3)
Chem 13: General Chemistry (4)
Phys 15: Elements of Electricity and Magnetism (3)
Elective: Selected from humanities or social sciences (3)

Fourth Semester

ApSc 58: Analytical Mechanics II (3)
ApSc 114: Engineering Analysis II (3)
CE 140: Materials Science (3)
EE 11: Linear Networks I (3)
Phys 16: Introduction to Modern Physics (3)
Elective: Selected from humanities or social sciences (3)

Electrical Engineering Curriculum

Fifth Semester

EE 12: Linear Networks II (3)
EE 20: Introductory Engineering Electronics (3)
EE 31: Fields and Waves I (3)
EE 60: Introductory Electrical Engineering Laboratory I (2)
EE 157: Machine and Assembly Language Programming (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 32: Fields and Waves II (3)
EE 61: Introductory Electrical Engineering Laboratory II (2)
EE 121: Engineering Electronics and Design (3)
EE 152: Introduction to Digital Computers (3)
EE 177: Electrical Energy Conversion (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

EE 122: Pulse and Waveshaping Electronic Design (3)
EE 143: Elements of Communication Engineering I (3)
EE 161: Electrical Engineering Laboratory (2)
Elective: Technical electives (9) (three courses selected from EE 113, 133, 153, 155, 178; ME 131, 187)

Eighth Semester

EE 144: Elements of Communication Engineering II (3)
EE 162: Electrical Engineering Laboratory (2)
EE 172: Control Systems (3)
Elective: Technical electives (5) (two courses selected from EE 116, 124, 160, 165, 184; ME 194)

Technical Electives

EE 113: Network Analysis and Design (3)
EE 116: Introduction to Network Synthesis (3)
EE 124: Electronic Devices (3)

EE 133:	Electromagnetic Waves (3)
EE 153:	Design of Switching Systems (3)
EE 155:	Introduction to Numerical Methods for Computers (3)
EE 160:	Electrical Measurements and Instrumentation (3)
EE 165:	Senior Design Project (2)
EE 178:	Electrical Power Systems (2)
EE 184:	Introduction to Medical Engineering (3)
ME 131:	Thermodynamics (3)
ME 187:	Heat Transfer Theory (3)
ME 194:	Energy Conversion (3)

Computer Science Option

Computer science is a developing discipline which combines electronic de... programming of computers, and mathematics into a single comprehensive ... The student learns the design and utilization of computers for scientific ... business applications. Students who complete this option will be able to de... both the hardware and software needed for minicomputer and large-... computing systems. The student will also be competent in hardware and ... ware utilization of computers for control of large systems. The curricu... prepares the student for a career in computer design, applications, and ... tion, or to continue study in graduate school.

Prerequisite: first four semesters as described in the Core Curriculum, ... pages 108–109.

Fifth Semester

CSci 157:	Machine and Assembly Language Programming (3)
EE 12:	Linear Networks II (3)
EE 20:	Introductory Engineering Electronics (3)
EE 31:	Fields and Waves I (3)
EE 60:	Introductory Electrical Engineering Laboratory I (2)
Elective:	Selected from humanities or social sciences (3)

Sixth Semester

CSci 152:	Introduction to Digital Computers (3)
CSci 159:	Programming and Data Structures (3)
EE 32:	Fields and Waves II (3)
EE 61:	Introductory Electrical Engineering Laboratory II (2)
EE 121:	Engineering Electronics and Design (3)
Elective:	Selected from humanities or social sciences (3)

Seventh Semester

CSci 153:	Design of Switching Systems (3)
CSci 155:	Introduction to Numerical Methods for Computers (3)
CSci 158:	Algorithmic Methods and High-level Languages (3)
CSci 161:	Computer Science Laboratory (2)
EE 122:	Pulse and Waveshaping Electronic Design (3)
Elective:	Technical elective (3) (one course selected from EE 113, ... 143)

Eighth Semester

CSci 154:	Digital Computer Design (3)

CSci 156: Introduction to Systems Programming (3)
CSci 162: Computer Science Laboratory (2)
EE 172: Control Systems (3)
Elective: Technical elective (3) (one course selected from EE 124, 144, 184)

Technical Electives

EE 113: Network Analysis and Design (3)
EE 124: Electronic Devices (3)
EE 133: Electromagnetic Waves (3)
EE 143: Elements of Communication Engineering I (3)
EE 144: Elements of Communication Engineering II (3)
EE 184: Introduction to Medical Engineering (3)

Premedical Engineering Option

The Premedical Engineering option will permit the student who completes the work to obtain a Bachelor's degree in engineering and have sufficient preparation to apply to a medical school for work toward a doctor of medicine degree. The student will also have sufficient background to work in various allied health fields, in the research and development of new electronic equipment used in medicine, or to continue as a graduate student in engineering with exceptional qualifications for medical engineering.

Prerequisite: first four semesters as described in the Core Curriculum, see pages 108–109.

Fifth Semester

BiSc 11: Introductory Biology for Science Majors (4)
EE 12: Linear Networks II (3)
EE 20: Introductory Engineering Electronics (3)
EE 31: Fields and Waves I (3)
EE 60: Introductory Electrical Engineering Laboratory I (2)
EE 157: Machine and Assembly Language Programming (3)

Sixth Semester

BiSc 12: Introductory Biology for Science Majors (4)
Chem 22: Introductory Quantitative Analysis (4)
EE 32: Fields and Waves II (3)
EE 61: Introductory Electrical Engineering Laboratory II (2)
EE 121: Engineering Electronics and Design (3)
EE 152: Introduction to Digital Computers (3)

Seventh Semester

Chem 151: Organic Chemistry (3)
Chem 153: Organic Chemistry Laboratory (1)
EE 122: Pulse and Waveshaping Electronic Design (3)
EE 143: Elements of Communication Engineering I (3)
EE 161: Electrical Engineering Laboratory (2)
Elective: Selected from humanities or social sciences (3)
Elective: Technical elective (3)

Eighth Semester

Chem 152:	Organic Chemistry (3)
Chem 154:	Organic Chemistry Laboratory (1)
EE 144:	Elements of Communication Engineering II (3)
EE 162:	Electrical Engineering Laboratory (2)
EE 172:	Control Systems (3)
Elective:	Selected from humanities or social sciences (3)
Elective:	Technical elective (3)

Technical Electives

Bioc 221–22:	General Biochemistry (3 or 4—4 or 5)
BiSc 145:	Introduction to Vertebrate Embryology (4)
BiSc 148:	Histology (4)

Electrical Engineering Undergraduate Courses

11 Linear Networks I (3)

Signals and waveforms, average value and RMS, network concepts ments, and parameters. Kirchhoff's laws, simple networks, energy power, differential equations of networks and their solution, phasor steady-state analysis, measurements, impedance concepts, resonance filtering. Prerequisite or concurrent registration: ApSc 114, Phys (Spring—day and evening; fall—evening)

12 Linear Networks II (3)

Singular functions; Laplace transform; network functions, poles and total response; time and frequency domains; convolution theorems; Fou analysis, spectra; frequency response, Bode plots; two-port parame Prerequisite: ApSc 114, EE 11. (Every fall—day and evening; spr —evening)

20 Introductory Engineering Electronics (3)

Various types of devices used in electronic engineering considered by the point of view of the physics of their operation and from the engin ing point of view of their application to electronic circuits. Solid-st vacuum, and gaseous devices. Primary emphasis on application of elements in power supplies and in linear amplifiers. Introduction to sign concepts through use of graphical techniques. Prerequisite: EE (Fall—day and evening; spring—evening)

31 Fields and Waves I (3)

Vector calculus, orthogonal coordinates, Coulomb's and Gauss' laws, sca potential, dipoles, method of images, Laplace's and Poisson's equation boundary-value problems. Prerequisite: Phys 16, ApSc 114. (Ev fall—day; fall, even years—evening)

32 Fields and Waves II (3)

Biot-Savart law, Ampere's law, vector potential, magnets, polarization a polarization currents, Faraday's law, Maxwell's equations, plane wav and Poynting vector. Prerequisite: EE 31. (Every spring—day; spri odd years—evening)

51 Applications of Computers (3) (Same as CSci 51)

Introduction to the solution of problems on a digital computer using FORTRAN and BASIC languages; data processing concepts and numer

cal methods using batch and interactive time-shared terminal computer systems; writing, debugging, and running programs on various digital computer systems. (Academic year—day and evening)

52 **Computers and Societal Problems** (3) (Same as CSci 52)

Application of the digital computer to the analysis and synthesis of physical, social, cultural, economic, and environmental processes and systems. Software methods for simulation, graphic display, data reduction, and file generation and access in time-shared and batch environments using FORTRAN and BASIC. Computer-related societal problems and processes. Group projects emphasizing research and investigative techniques applied to student-selected interests. Prerequisite: CSci or EE 51 or equivalent; two years of college preparatory mathematics. (Spring—day; spring, even years—evening)

60 **Introductory Electrical Engineering Laboratory I** (2)

Use, theory of design, and application of standard electronic laboratory equipment; applications of instrumentation through experiments in basic network theorems; measurement of electrical quantities and characteristics of electrical devices. Prerequisite or concurrent registration: EE 12, 20, 31. (Fall—day and evening; spring—evening)

61 **Introductory Electrical Engineering Laboratory II** (2)

Characteristics of electronic devices and circuits; design of electronic amplifiers and measurement of their properties; experiments in support of courses in networks, fields, and electronics. Prerequisite or concurrent registration: EE 12, 32, 60, 121. (Spring—day and evening; fall—evening)

113 **Network Analysis and Design** (3)

Applications of matrix theory and linear graphs to electrical network analysis; network equations; signal-flow graphs; introduction to state-space techniques; solution of state-space equations on a digital computer. Network transfer functions, properties of active networks including reciprocity, stability, activity, and feedback. Use of network analysis programs such as ECAP. Prerequisite: EE 12, 20. (Every fall—day; fall, even years—evening)

116 **Introduction to Network Synthesis** (3)

Network functions and their properties. Positive-real functions and testing for this property. Two-element, one-port network synthesis; RLC one-port synthesis; the approximation problem in the frequency domain; modern filter theory and design; two-port ladder and lattice synthesis. Introduction to digital filters; truncation errors; realization techniques. Prerequisite: EE 113. (Every spring—day; spring, odd years—evening)

121 **Engineering Electronics and Design** (3)

Graphical analysis and design beyond the level covered in EE 20. Introduction of incremental analysis and design methods to electronic circuits; use of equivalent circuits; amplifiers, oscillators, modulation and demodulation. Prerequisite: EE 20. (Every spring—day; academic year—evening)

122 **Pulse and Waveshaping Electronic Design** (3)

Introduction to and design of nonlinear circuits used in modern-day computer and communications systems. Pulse, sweep, switching, and logic circuits; counting and timing circuits. Prerequisite: EE 121. (Every fall—day; fall, even years—evening)

124 **Electronic Devices** (3)

Principles of operation of electronic devices used in electrical
communication systems, and electronic circuits. Properties of
devices and their applications. Modeling of devices such as diod
sistors, and lasers. Fabrication methods of discrete components
grated circuits. Prerequisite: EE 12, 20, 32; Phys 16. (Every
day; spring, odd years—evening)

133 **Electromagnetic Waves** (3)

Time-harmonic Maxwell equations, complex Poynting vector, tran
lines, characteristics of common waveguides, resonant cavities, Smi
Lorentz reciprocity, simple antennas, linear antenna arrays. Prere
EE 32. (Every fall—day; fall, even years—evening)

143 **Elements of Communication Engineering I** (3)

Fourier series and transforms; power spectra and correlation; princ
modulation; amplitude, angle, and pulse modulation; modulation
modulation systems; time and frequency division multiplexing. Pre
site or concurrent registration: EE 12, 121. (Every fall—day;
years—evening)

144 **Elements of Communication Engineering II** (3)

Introduction to the statistical theory of communication, random
and noise, concepts of information theory, transmission of infor
over noisy channels, comparison of modulation systems in the pres
noise. Prerequisite: EE 143. (Every spring—day; spring, eve
—evening)

152 **Introduction to Digital Computers** (3) (Same as CSci 152)

Design of digital computers using integrated circuits. Combinationa
and digital logic circuits. Boolean algebra, number systems, code
arithmetic operations in digital computers. Use of LSI in digital
Microprocessors and interfacing with I/O equipment. Minicomput
sign and programming. Analog computers, analog-to-digital conver
and analog components. Prerequisite: CSci 157 or permission of
tor. (Spring—day and evening)

153 **Design of Switching Systems** (3) (Same as CSci 153)

Switching algebra and Boolean logic; sets, relations, and lattices. Ana
and design of switching devices; design of combinational logic net
Minimization techniques and decomposition methods. Electronic
mentation of logic; contact networks, symmetric functions, and thre
logic. Reliable design and fault-detection tests. Number systems and
geometric interpretation, error detecting and correcting codes; encoders
decoders. Logic and electronic design of functional digital units. Seq
tial circuits and iterative networks. Minimization and transformation
quential machines; structure of sequential machines; partitions and
State identification and fault-detection experiments. Prerequisite: CS
EE 152 or permission of instructor. (Fall—day and evening)

154 **Digital Computer Design** (3) (Same as CSci 154)

Logic and electronic design of functional digital units. Design of dig
computer subsystems, flow of information and logical flow diagrams
timing and control signals. Design of binary and decimal, serial and

allel digital arithmetic units. Design of memory subsystems, channels, I/0, and storage subsystems. Design of the control unit of a digital computer. Introduction to microprogramming. Design of a small digital computer. Prerequisite: CSci or EE 153 or permission of instructor. May be taken for graduate credit. (Spring—day and evening)

155 **Introduction to Numerical Methods for Computers** (3) (Same as CSci 155)

Use of numerical methods in engineering and scientific problems. Concepts of algorithm and flowchart, errors in computer and numerical methods. Introduction to numerical methods for the solution of simultaneous linear algebraic equations, roots of equations, determination of eigenvalues and eigenvectors, numerical differentiation and integration, interpolation and solution of ordinary and partial differential equations. Statistical methods for the evaluation of experimental data and correlation techniques, curve fitting. Prerequisite: ApSc 114, CSci or EE 51; or equivalent. (Every fall—day; fall, even years—evening)

156 **Introduction to Systems Programming** (3) (Same as CSci 156)

Computer software systems; concepts in the use of macro-assemblers, loaders, monitors, dispatchers, initiators, and control programs. Control of input-output in a multiprogrammed environment. Control of the task, job stream, and secondary storage. Job control languages. Prerequisite: CSci 158 and CSci 159. (Spring—day; spring, even years—evening)

157 **Machine and Assembly Language Programming** (3)(Same as CSci 157)

Architecture of various digital computers. Number systems and codes. Programming of minicomputers and multiprogrammed large computers in machine and assembly language. Techniques in structured programming. Methods of addressing and machine control for fixed and variable word-length computers. Programming on a stack architecture computer. Input-output control on a minicomputer. Prerequisite: CSci or EE 51 or equivalent. (Fall—day and evening; spring—evening)

158 **Algorithmic Methods and High-level Languages** (3)(Same as CSci 158)

High-level programming languages. Comparison of computer languages and their structure. Structured programming with high-level languages. Introduction to compiler structure and parsing of statements. Syntax of high-level languages and their recognizers. Backus-Normal form, correctness of programs, reentrant programming and reentrant compilers. Introduction to simulation and simulation languages. Prerequisite: CSci 157 or permission of instructor. May be taken for graduate credit. (Fall—day and evening; spring—evening)

159 **Programming and Data Structures** (3) (Same as CSci 159)

Use of macro-assembler, subroutine linkages and 1/0 in an assembler, access methods and storage management, buffer pools and memory management, discrete structures and data structures in computing. Use of tree structures, arrays, lists, stacks, files, strings and linked structures. Sorting, searching, hashing, and merging of data files. List and string processing languages. Prerequisite: CSci or EE 157 or equivalent. (Spring—day and evening)

160 **Electrical Measurements and Instrumentation** (3)

Electrical measurement from direct current through high radio frequencies.

Measurements of current, voltage, power, resistance, capacitance, ance, energy, phase angle, frequency, and time. Measurements of frequency signals including field strength, signal-to-noise ratio, impe and attenuation. Analog-to-digital conversion techniques and digital mentation for the control of measurement and instrumentation sy Transducer characteristics and analog signal processing instrumen Laboratory demonstrations of measurements and instrumentation niques. Prerequisite: EE 12, 32, 121, 152. (Spring—evening)

161–62 **Electrical Engineering Laboratory** (2–2)

Experiments in support of courses in networks, electronics, microw computers, communications, controls, and machines. The student quired to begin a design project in EE 161 and complete it in EE Prerequisite or concurrent registration: EE 61, 113, 122; CSci or EE EE 161 is prerequisite to EE 162. (Academic year—day and eve

165 **Senior Design Project** (2)

The student will conceive, design, construct, and test an original pro in hardware or software. He will write a complete report inclu schematic diagrams and repair procedures, if applicable. This pr cannot be used to satisfy the project required in EE 161–62 *Ele Engineering Laboratory*. Prerequisite: senior status. (Spring—

172 **Control Systems** (3)

Mathematical models of linear systems; steady-state and transient analy root locus and frequency response methods; synthesis of linear feedb control systems. Prerequisite: ApSc 114, EE 12 or ME 134. (Sp —day and evening)

177 **Electrical Energy Conversion** (3)

Fundamentals of electromechanical energy conversion. Electromechan transducers and their equivalent circuits, three-phase and single-phase rotating machines, d-c machines, rotating machines as circuit elements Prerequisite: EE 12, 31. (Every spring—day; spring, even years evening)

178 **Electrical Power Systems** (2)

Introduction to electrical power systems; transmission and distribution electrical power, three-phase circuits, symmetrical components, fault ana ysis by digital computer. Load-flow studies, economic considerations Power station designs and synchronization of generators. Methods generating electrical power. Prerequisite: EE 177, senior status. (Fall—evening)

184 **Introduction to Medical Engineering** (3)

Designed to introduce the engineering or physical sciences student to th applications of engineering in the medical sciences; terminology of the m ical profession emphasized; the physiology of the human body presented from over-all systems or functional approach; survey of present-day inst cal measurements and consideration of those areas in which engineering may be applied advantageously to medicine. May be taken for graduate credit. Admission by permission of instructor. (Spring—evening)

198 **Research** (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite junior or senior status. (Fall and spring)

Computer Science Undergraduate Courses

51 Applications of Computers (3)

Introduction to the solution of problems on a digital computer using FORTRAN and BASIC languages; data processing concepts and numerical methods using batch and interactive time-shared terminal computer systems; writing, debugging, and running programs on various digital computer systems. (Academic year—day and evening)

52 Computers and Societal Problems (3)

Application of the digital computer to the analysis and synthesis of physical, social, cultural, economic, and environmental processes and systems. Software methods for simulation, graphic display, data reduction, and file generation and access in time-shared and batch environments using FORTAN and BASIC. Computer-related societal problems and processes. Group projects emphasizing research and investigative techniques applied to student-selected interests. Prerequisite: CSci or EE 51 or equivalent; two years of college preparatory mathematics. (Spring—day; spring, even years—evening)

152 Introduction to Digital Computers (3)

Design of digital computers using integrated circuits. Combinational logic and digital logic circuits. Boolean algebra, number systems, codes, and arithmetic operations in digital computers. Use of LSI in digital design. Micro processors and interfacing with I/0 equipment. Minicomputer design and programming. Analog computers, analog-to-digital conversion, and analog components. Prerequisite: CSci 157 or permission of instructor. (Spring—day and evening)

153 Design of Switching Systems (3)

Switching algebra and Boolean logic; sets, relations, and lattices. Analysis and design of switching devices; design of combinational logic networks. Minimization techniques and decomposition methods. Electronic implementation of logic; contact networks, symmetric functions, and threshold logic. Reliable design and fault-detection tests. Number systems and codes, geometric interpretation, error detecting and correcting codes; encoders and decoders. Logic and electronic design of functional digital units. Sequential circuits and iterative networks. Minimization and transformation of sequential machines; structure of sequential machines; partitions and covers. State identification and fault-detection experiments. Prerequisite: CSci 152 or permission of instructor. (Fall—day and evening)

154 Digitnl Computer Design (3)

Logic and electronic design of functional digital units. Design of digital computer subsystems, flow of information and logical flow diagrams in timing and control signals. Design of binary and decimal, serial and parallel digital arithmetic units. Design of memory subsystems, channels, I/0, and storage subsystems. Design of the control unit of a digital computer. Introduction to microprogramming. Design of a small digital computer. Prerequisite: CSci 153 or permission of instructor. May be taken for graduate credit. (Spring—day and evening)

155 Introduction to Numerical Methods for Computers (3)

Use of numerical methods in engineering and scientific problems. Con-

cepts of algorithm and flowchart, errors in computer and numerical
ods. Introduction to numerical methods for the solution of simul
linear algebraic equations, roots of equations, determination of eige
and eigenvectors, numerical differentiation and integration, interpo
and solution of ordinary and partial differential equations. Statistical
ods for the evaluation of experimental data and correlation tech
curve fitting. Prerequisite: ApSc 114, CSci or EE 51; or equiv
(Every fall—day; fall, even years—evening)

156 **Introduction to Systems Programming** (3)

Computer software systems; concepts in the use of macro-asse
loaders, monitors, dispatchers, initiators, and control programs. C
of input-output in a multiprogrammed environment. Control of the
job, job stream, and secondary storage. Job control languages. Pre
site: CSci 158 and CSci 159. (Spring—day; spring, even y
evening)

157 **Machine and Assembly Language Programming** (3)

Architecture of various digital computers. Number systems and
Programming of minicomputers and multiprogrammed large comp
in machine and assembly language. Techniques in structured prog
ming. Methods of addressing and machine control for fixed and var
wordlength computers. Programming on a stack architecture comp
Input-output control on a minicomputer. Prerequisite: CSci or EE 5
equivalent. (Fall—day and evening; spring—evening)

158 **Algorithmic Methods and High-level Languages** (3)

High-level programming languages. Comparison of computer langu
and their structure. Structured programming with high-level langua
Introduction to compiler structure and parsing of statements. Syntax
high-level languages and their recognizers. Backus-Normal form, comp
ness of programs, reentrant programming and reentrant compilers. In
duction to simulation and simulation languages. Prerequisite: CSci
or permission of instructor. May be taken for graduate credit. (Fall
day and evening; spring—evening)

159 **Programming and Data Structures** (3)

Use of a macro assembler, subroutine linkages and I/0 in an assembly
access methods and storage management, buffer pools and memory m
agement, discrete structures and data structures in computing. Use
tree structures, arrays, lists, stacks, files, strings and linked structu
Sorting, searching, hashing, and merging of data files. List and s
processing languages. Prerequisite: CSci or EE 157 or equiva
(Spring—day and evening)

161–62 **Computer Science Laboratory** (2–2)

Experiments in support of digital logic, electronics, systems and softwa
Use of integrated circuits and microprocessors to develop digital syste
Interfacing I/0 equipment to computers. Analog computing, hybrid co
puting, and A-to-D converters. The student begins a design project
CSci 161 and completes it in CSci 162. CSci 161 is prerequisite to C
162. Prerequisite or concurrent registration: EE 61, 122, CSci 153,
and 158. (Academic year—day and evening)

GRADUATE STUDY

The Department of Electrical Engineering and Computer Science provides the student who possesses a degree of maturity and basic knowledge one of the most stimulating experiences for advanced study. The Department offers study leading to the Master of Science, Professional, and Doctor of Science degrees. The student may study in an area of concentration such as Systems Science, Networks, and Controls; Electrophysics (electronics, fields and waves); Communications; Medical Engineering; Computer Science (hardware, software, and systems); Computer Heuristics, Modeling, and Numerical Methods; and Energy Conversion, Power, and Transmission.

The graduate programs are formulated to take into consideration the student's individual strengths, skills, aspirations, and abilities and are determined through consultation by the student with the faculty adviser. The program should provide the student with a thorough understanding of the area of concentration and with a breadth of knowledge necessary in modern engineering and computer science. Each graduate student is assigned a faculty adviser on the basis of study interests, which develops a close student-faculty relationship during the course of the program.

The graduate programs are also designed to provide an educational service to the Washington technical community. Many courses have been developed after consultation with private industry and government agencies in the area. They are offered both during the afternoon and evening and rotate from year to year.

The Department of Electrical Engineering and Computer Science has continuously kept the graduate program up to date through contact with recent developments, research generated within the Department, and the addition of experts in appropriate fields who serve as part-time and adjunct faculty.

The Department of Electrical Engineering and Computer Science publishes a detailed brochure to supplement the present catalogue with information about procedures, requirements, regulations, and scope of its graduate programs. Special pamphlets describing specific programs are also available.

Areas of Concentration

COMMUNICATIONS

EE 204: Stochastic Signals and Noise
EE 205: Stochastic Processes in Electrical Engineering
EE 241: Information Theory
EE 242: Coding Theory
EE 243: Communication Theory I
EE 244: Communication Theory II
EE 245: Signal Detection and Estimation Theory
EE 246: Digital Communications
EE 247: Communication Systems
EE 249: Data Telecommunication Networks
EE 252: Digital Signal Processing Techniques
EE 253: Sonar Systems
EE 254: Radar Systems
EE 257: Issues in Computer Communications

EE 258: Radio Communication Systems I
EE 259: Radio Communications Systems II
EE 277: Space Communication Systems
EE 298: Research
EE 299–300: Thesis Research
EE 345: Advanced Detection Theory
EE 349: Communications Research
EE 399: Dissertation Research

COMPUTER HEURISTICS, MODELING, AND NUMERICAL METHODS

ApSc 211: Analytical Methods in Engineering I
ApSc 212: Analytical Methods in Engineering II
ApSc 213: Analytical Methods in Engineering III
ApSc 214: Analytical Methods in Engineering IV
CSci 158: Algorithmic Methods and High-Level Languages
CSci 223: Simulation and Heuristics
CSci 281: Applications of Numerical Methods I
CSci 282: Applications of Numerical Methods II
CSci 285: Approximation of Functions and Data Representations
CSci 286: Numerical Methods in Engineering I
CSci 287: Numerical Methods in Engineering II
CSci 288: Numerical Methods in Engineering III
CSci 289: Numerical Methods in Engineering IV

COMPUTER SCIENCE (HARDWARE, SOFTWARE, AND SYSTEMS)

CSci 201: Introduction to Computer Systems I
CSci 202: Introduction to Computer Systems II
CSci 208: Computer Programming
CSci 213: Discrete Structures in Computing
CSci 214: Data Structures
CSci 216: Information Retrieval Systems
CSci 219: Interactive Computer Graphics
CSci 220: Pattern Recognition
CSci 223: Simulation and Heuristics
CSci 227: Management Information Systems and Data Base Manage
CSci 232: Automata Theory
CSci 237: Computing Systems
CSci 239: Comparative Computer Systems
CSci 240: Theory and Practice of Microprogramming
CSci 245: Advanced Computer Systems Theory I
CSci 246: Advanced Computer Systems Theory II
CSci 255: Formal Languages, Correctness, and Structured Programmi
CSci 256: Design of Translators
CSci 263: Digital Computer Programming Systems
CSci 267: Operating Systems I
CSci 268: Operating Systems II
CSci 278: Analog and Hybrid Computers
CSci 298: Research
CSci 299–300: Thesis Research
CSci 391: Computer Science Research
CSci 399: Dissertation Research

ELECTROPHYSICS (ELECTRONICS, FIELDS AND WAVES)

EE 201: Natural Modes and Transients in Electrical Systems
EE 206: Electromagnetic Theory and Applications I
EE 207: Electromagnetic Theory and Applications II
EE 221: Physical Electronics I
EE 222: Physical Electronics II
EE 223: Optical Communications Systems
EE 224: Electronics of Lasers
EE 225: Nonlinear Electronics
EE 226: Fiber and Integrated Optics
EE 227: Industrial Electronics
EE 228: High-frequency Electronics
EE 229: Precise Optical Measurements
EE 231: Field Analysis and Potential Theory
EE 232: Electrodynamics
EE 233: Microwaves and Components
EE 234: Electromagnetic Wave Propagation
EE 235: Antennas
EE 236: Plasma Dynamics
EE 237: Waves in Random Media
EE 238: Precise Microwave Measurements
EE 239: Precise Electrical Standards
EE 255: Optical Processing
EE 298: Research
EE 299–300: Thesis Research
EE 323: Principles of Microelectronics
EE 329: Electrophysics Research
EE 399: Dissertation Research

ENERGY CONVERSION, POWER, AND TRANSMISSION

EE 201: Natural Modes and Transients in Electrical Systems
EE 202: Linear System Theory I
EE 212: Advanced Network Analysis
EE 261: Electromechanical Energy Conversion
EE 264: Direct Electrical Energy Conversion
EE 265: Electrical Power Production
EE 266: Electrical Power Transmission and Distribution
EE 267: Power Networks
EE 269: Issues in Electrical Power Systems

MEDICAL ENGINEERING

EE 256: Environmental Optics
EE 281: Medical Instrumentation I
EE 282: Medical Instrumentation II
EE 283: Introduction to Medicine for Engineers I: Physiology and Anatomy
EE 284: Introduction to Medicine for Engineers II: Clinical Medicine
EE 285: Engineering in Physical Medicine and Rehabilitation
EE 286: Sensory Evoked Potentials I
EE 287: Computer-aided Analysis of Physiological Signals
EE 288: Physiological Controls and Systems
EE 289: Clinical Engineering

EE 298:	Research
EE 299–300:	Thesis Research
EE 381:	Bioelectric Phenomena
EE 386:	Sensory-evoked Potentials II
EE 389:	Medical Engineering Research
EE 399:	Dissertation Research

SYSTEMS SCIENCE, NETWORKS, AND CONTROLS

EE 201:	Natural Modes and Transients in Electrical Systems
EE 202:	Linear System Theory I
EE 203:	Linear System Theory II
EE 212:	Advanced Network Analysis
EE 213:	Computer-aided Analysis and Design of Networks
EE 215:	Linear Network Synthesis I
EE 216:	Linear Network Synthesis II
EE 272:	Discrete Systems
EE 273:	System Optimization
EE 274:	Nonlinear Systems
EE 275:	System Identification and Adaptive Systems
EE 276:	Cybernetics
EE 278:	Spacecraft Systems Design
EE 298:	Research
EE 299–300:	Thesis Research
EE 319:	Systems Science, Networks, and Controls Research
EE 371:	Simulation Methods for System Analysis
EE 372:	Analysis and Control of Large Systems
EE 399:	Dissertation Research

THE MASTER OF SCIENCE DEGREE PROGRAM

The Department of Electrical Engineering and Computer Science offers
uate study leading to the degree of Master of Science in the following are
concentration. Faculty members who may serve as advisers are listed
each area.

1. Communications (Braun, Helgert, Heller, Lang, Pickholtz)
2. Computer Heuristics, Modeling, and Numerical Methods (Abd-
Bock, Feldman, Maurer, Meltzer)
3. Computer Science (hardware, software, and systems) (Abd-Alla,
Feldman, Kyriakopoulos, Maurer, Meltzer)
4. Electrophysics (electronics, fields and waves) (Braun, Eisenberg,
Kahn, Lang)
5. Energy Conversion, Power, and Transmission (Meltzer, Kahn, Lang)
6. Medical Engineering (Eisenberg)
7. Systems Science, Networks, and Controls (Kyriakopoulos, Lee, Melt

There are no required courses or programs of study in any of the area
concentration. Each student formulates an individualized program in cons
tion with the assigned faculty adviser.

Admission

In addition to the School of Engineering and Applied Science requirement

admission to graduate study (see pages 24–25), applicants for Master of Science programs in the Department of Electrical Engineering and Computer Science must meet the following general and specific requirements.

GENERAL REQUIREMENTS

1. The applicant must be recommended for admission by the Chairman of the Department of Electrical Engineering and Computer Science.
2. The applicant must have at least a quality-point index of 2.50 (on a scale with 4.00 maximum), or equivalent, for the last 60 semester hours of undergraduate work.
3. The applicant must be adequately prepared in the basic sciences (chemistry, physics, and/or biology) and in mathematics (calculus through differential equations).

SPECIFIC REQUIREMENTS

In addition to the general requirements, the applicant must have satisfied through undergraduate studies the following specific requirements according to the area in which he or she plans to concentrate:

Communications

1. Networks with applications using Laplace transforms (6 semester hours—EE 11 and 12; or equivalent)
2. Electronics (3 semester hours—EE 20; or equivalent)
3. Communication theory (3 semester hours—EE 143; or equivalent)

Computer Heuristics, Modeling, and Numerical Methods

1. Computer programming using FORTRAN (3 semester hours—CSci 51, or equivalent)
2. Mathematics including partial differential equations, matrices, and eigenvalue problems)
3. Probability and statistics (3 semester hours—ApSc 115; or equivalent)

Computer Science

1. Computer programming using FORTRAN (3 semester hours—EE 51; or equivalent)
2. Computer hardware or computer software (6 semester hours—CSci 153 and 154, or CSci 157 and 158; or equivalent)

Electrophysics

1. Networks with applications using Laplace transforms (6 semester hours—EE 11 and 12; or equivalent)
2. Electronics including analysis, design and physical theory (6 semester hours—EE 20 and 121; or equivalent)
3. Fields and waves (6 semester hours—EE 31 and 32; or equivalent)

Energy, Conversion, Power, and Transmission

1. Network analysis using Laplace transforms (6 semester hours—EE 11 and 12; or equivalent)
2. Fields and waves (6 semester hours—EE 31 and 32; or equivalent)
3. Electrical energy conversion (3 semester hours—EE 177; or equivalent)

Medical Engineering

1. Network theory (3 semester hours—EE 11; or equivalent)
2. Electronic circuits (6 semester hours—EE 20 and 121; or equi
3. Computer programming (3 semester hours—CSci 51; or equiva

Systems Science, Networks, and Controls

1. Networks with applications using Laplace transforms (9 semester EE 11, 12 and 113; or equivalent)
2. Electronics (3 semester hours—EE 20; or equivalent)
3. Control theory (3 semester hours—EE 172; or equivalent)

In cases where some undergraduate deficiencies exist, the student required to complete 6 semester hours of undergraduate work. Norma work must be completed prior to enrolling in graduate courses. If t ficiencies represent more than 6 semester hours, the applicant may mitted as an unclassified student to complete a specified undergraduate p before being admitted as a graduate student.

Program of Study

Upon admission to the Master of Science degree program, the gradua dent is assigned a faculty adviser. In consultation, the student and adviser formulate the program of study and complete the form "Gr Program of Studies" (Form 1) for submission to the Department Ch for approval. This form should be completed prior to or at the studen registration. During consultation, the student should determine whet request permission to pursue the nonthesis option.

The program of study for the Master of Science degree will consis minimum of 24 semester credit hours of graduate-level courses and 6 s hours of thesis; or, for the nonthesis option, a minimum of 33 credit ho graduate-level courses. For the thesis option, a minimum of 12 credit must be in the major field of concentration and no less than three gra courses must be in areas other than the student's area of concentration. For the nonthesis option, a minimum of 18 credit hours must be in the field and no less than three courses must be in areas other than the stu major area.

A maximum of two courses at the 100 level may be counted toward requirements for the degree; the course description must specify that course may be taken for graduate credit.

THE PROFESSIONAL DEGREE PROGRAM

The Department of Electrical Engineering and Computer Science offers uate study leading to a Professional Degree. This program provides for students who are interested in pursuing course work beyond the Ma Degree with emphasis on applied subject material rather than on resea Successful completion of the Professional Degree program leads to the De of Engineer or the Degree of Applied Scientist. Students may study fo Professional Degree in the following areas of concentration: Communica Computer Science (hardware, software, and systems); Electrophysics (elec ics, fields and waves); Medical Engineering; Systems Science, Networks

Controls; Energy Conversion, Power, and Transmission; and Computer Heuristics, Modeling, and Numerical Methods.

There are no formal required courses or programs of study in any of the areas of concentration for the Professional Degree. Each student formulates an individualized program in consultation with his or her assigned faculty adviser.

Admission

In addition to the School of Engineering and Applied Science requirements for admission to graduate study toward a Professional Degree (see pages 29–30), applicants for the Professional Degree programs in the Department of Electrical Engineering and Computer Science must meet the following general and specific requirements.

GENERAL REQUIREMENTS

1. The applicant must be recommended for admission by the Chairman of the Department of Electrical Engineering and Computer Science.
2. The applicant must have at least a quality-point index of 3.2 (on a scale of 4.00 maximum), or equivalent, in graduate course work leading to the master's degree; or a minimum of 3.0 and two years of professional experience after obtaining the master's degree.
3. The applicant must be adequately prepared in the basic sciences (chemistry, physics and/or biology) and in mathematics (calculus through differential equations).

SPECIFIC REQUIREMENTS

In addition to the general requirements, the applicant must also satisfy through previous studies the following specific requirements according to the area of concentration:

Communications

Six semester hours of statistical theory of communication and 3 semester hours of information theory—EE 241, 243 and 244; or equivalent.

Computer Heuristics, Modeling, and Numerical Methods

Six semester hours of numerical methods at the graduate level—CSci 281 and 282; or equivalent.

Computer Science

Nine semester hours of computer system design and software beyond the use of a compiler language—CSci 201, 202 and 213; or equivalent.

Electrophysics

Nine semester hours in physical electronics and electromagnetics at the graduate level—EE 206, 207 and 221; or equivalent.

Energy Conversion, Power, and Transmission

Six semester hours of electrical machine theory and networks at the graduate level—EE 261 and 266; or equivalent.

Medical Engineering

Six semester hours of medical engineering at the graduate level— and 284; or equivalent.

Systems Science, Networks, and Controls

Nine semester hours in network system analysis at the graduate l cluding a knowledge of state space and linear graph theory—EE 201, 203; or equivalent.

An applicant who fails to meet the above specific requirements, b all other admission requirements, may be admitted with a program which is increased beyond the minimum requirements so that sufficie ground material may be covered.

Program of Study

Upon admission to the Professional Degree program, the student is ass faculty adviser. Together they will formulate a program of study for t dent which must contain a minimum of 30 semester hours of course complete the form "Graduate Program of Study." Programs of study a subsequent changes must be approved by both the faculty adviser a Department chairman.

The program of study for the Professional Degree in the Departme Electrical Engineering and Computer Science will normally consist of a mum of 18 semester hours of graduate-level courses in the major area o centration and a minimum of 9 additional semester hours of graduate courses outside the major area but in support of the student's progra student who is changing his major area from that studied for the M degree or who is lacking the specific requirements needed for admissio be required to take additional courses to make up deficiencies. Such tional work should not normally exceed 12 semester hours.

THE DOCTOR OF SCIENCE PROGRAM

The Department of Electrical Engineering and Computer Science offers grams of graduate study leading to the degree of Doctor of Science areas of concentration listed below. There are no formal required course programs of study in the areas listed. Upon admission, each student formu an individualized program in consultation with the assigned faculty adv Faculty members who may serve as advisers are listed after each area.

1. Communications (Braun, Helgert, Heller, Lang, Pickholtz)
2. Computer Heuristics, Modeling, and Numerical Methods (Bock, Ma Meltzer)
3. Computer Science (Abd-Alla, Bock, Feldman, Maurer, Meltzer)
4. Electrophysics (Braun, Eisenberg, Heller, Kahn, Lang)
5. Medical Engineering (Eisenberg)
6. Systems Science, Networks, and Controls (Kyriakopoulos, Lee, Mel

Admission

In addition to the School of Engineering and Applied Science requirements

admission to graduate study toward the Doctor of Science degree (see pages 31–32), applicants for the Doctor of Science degree in the Department of Electrical Engineering and Computer Science must meet the following general and specific requirements.

GENERAL REQUIREMENTS

1. The applicant must be recommended for admission by the Chairman of the Department of Electrical Engineering and Computer Science.
2. The applicant must have a minimum quality-point index of 3.20 (on a scale of 4.00 maximum), or equivalent, in graduate course work leading to the Master's degree.
3. The applicant must be adequately prepared in the basic sciences, chemistry, physics and/or biology) and in mathematics (calculus through differential equations).

SPECIFIC REQUIREMENTS

In addition to the above general requirements, the applicant must also satisfy through previous studies the following specific requirements according to the area of concentration (major area):

Communications

Six semester hours of statistical theory of communication and 3 semester hours of information theory—EE 241, 243 and 244; or equivalent.

Computer Heuristics, Modeling, and Numerical Methods

Six semester hours of numerical methods at the graduate level—CSci 281 and 282; or equivalent.

Computer Science

Nine semester hours of computer system design and software beyond the use of a compiler language—CSci 201, 202 and 213; or equivalent.

Electrophysics

Nine semester hours in electronics and electromagnetics fields and waves at the graduate level—EE 206, 207 and 221; or equivalent.

Medical Engineering

Six semester hours of medical engineering at the graduate level—EE 283 and 284; or equivalent.

Systems Science, Networks, and Controls

Nine semester hours in network system analysis at the graduate level, including a knowledge of state space and linear graph theory—EE 201, 202 and 203; or equivalent.

An applicant who fails to meet the above specific requirements, but meets all other admission requirements, may be admitted with a program of study which is increased beyond the minimum requirements so that sufficient background material may be covered for doctoral studies.

Program of Study

At the time of admission, the graduate student in pursuit of a D
Science Degree in the Department of Electrical Engineering and C
Science is assigned a faculty adviser in his major area of study. In
tion with his adviser, the student will determine the two minor areas
and the foreign language important in the student's field of study.
they will formulate a program of study for the student leading to the
ing Examination and complete the form "Graduate Program of
(Form 1). Programs of study and any subsequent changes must be
by both the faculty adviser and Department chairman.

MAJOR AREA

The program of studies for the Doctor of Science degree will normally
of one major area of concentration and two minor areas totaling a m
of 30 semester hours of graduate-level courses (200 and above) bey
Master's degree level. A minimum of 15 semester hours must be taker
major area. A student who is changing the major area from that stud
the Master's degree or who is missing specific admission requirements
required to take additional courses to make up deficiencies. Such ad
work should not normally exceed 12 semester hours.

MINOR AREAS

The student in consultation with the faculty adviser formulates a progr
study which includes two minor areas as part of the total doctoral stud
those students who take their minor area studies within the Departme
Electrical Engineering and Computer Science, the following courses
adequate programs in each minor area:

Communications
EE 204; 205 or 241; 243; and 244 or 249

Computer Heuristics, Modeling, and Numerical Methods
CSci 223, 281, 282, and 285

Computer Science
CSci 201, 202, 213, and 214 or 237 or 263

Electrophysics
EE 201, 206, 207, and 221

Energy Conversion, Power, and Transmission
EE 202, 261, 264, and 265

Medical Engineering
EE 281, 282, 283, and 284

Systems Science, Networks, and Controls
EE 202, 203, 212, and 273

Minor areas are not confined to the Department of Electrical Engineering and Computer Science, but may be taken from other departments within the University such as Mathematics, Statistics, Operations Research, and Physics. Normally a minimum of three graduate-level courses constitutes a minor area.

Electrical Engineering Graduate Courses

201 Natural Modes and Transients in Electrical Systems (3)

Transient response and natural modes of electrical systems; techniques for analyzing systems with periodic and aperiodic inputs and outputs; sampling. Prerequisite: graduate status. (Fall and spring—evening)

202 Linear System Theory I (3)

Graph theory and its application to networks and systems; system description in time and frequency domain; linear spaces and linear operators; mathematical representation of linear systems; analytical and computer solutions of the state equations; transient and steady-state response. Prerequisite: graduate status. (Fall—evening)

203 Linear System Theory II (3)

System properties; controlability and observability of linear systems; sensitivity and stability analyses. Irreducible realizations of rational transfer-function matrices; canonical forms, state feedback, and state estimators. Linear composite systems. Prerequisite: EE 202. (Spring—evening)

204 Stochastic Signals and Noise (3)

Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear mean-squared estimation; stationary estimation, stationary random processes, correlation functions, power spectrum; output of linear systems with stochastic inputs; Gaussian processes. Applications drawn for communications, control theory, computer science. (Fall and spring—evening)

205 Stochastic Processes in Electrical Engineering (3)

Markov chains, state classification, Kolmogorov equation; applications to probabilistic finite-state machines. Birth-death process, applications to queuing theory, buffer problems, and the design of communication nets. Continuous state processes, diffusion processes, passage times, and estimation problems. Estimation and power spectra. Stochastic difference and differential equations. Applications to communication theory, control theory, computer science, and propagation theory of random media. Prerequisite: EE 204 or equivalent. (Spring—evening)

206 Electromagnetic Theory and Applications I (3)

Brief review of vector-phasors and Maxwell's equations, electromagnetic potentials, power and energy; plane waves, frustrated total reflection, skin effect, anisotropic media; solution of radiation problems in the Kirchoff approximation; elementary applications. Prerequisite: EE 133 or equivalent. (Fall—evening)

207 Electromagnetic Theory and Applications II (3)

Introduction to advanced techniques for problems in electromagnetics; leaky waves and complex wave-types, stationary phase and steepest descent approximations for integrals in the complex plane. Discrete and continuous spectra. Application to optical fibers, surface and leaky wave an-

tennas, ground wave propagation. Prerequisite: EE 201 or equiv
206. (Spring—evening)

212 **Advanced Network Analysis** (3)
Network theorems, network functions, relationship of parts of functions; network properties, realizability and causality concep puter-aided network analysis. Prerequisite: EE 201, 202 or eq (Spring, odd years—evening)

213 **Computer-aided Analysis and Design of Networks** (3)
Description and use of network analysis programs such as CORNAP, and NASAP. Algorithmic methods for time and f domain analysis of networks using a digital computer, numerical of state equations, fast Fourier transform, network design by e searches on digital computers, synthesis of electrical networks usin strained optimization techniques in the time domain, network through approximation such as Fourier series, Chebyscheff functi Padé approximation. Prerequisite: EE 51, 212. (Fall, odd evening)

215 **Linear Network Synthesis I** (3)
Properties and testing of positive real functions. Synthesis of LC one-port networks. Brune, Bott-Duffin, Miyata, Kuh, and Darling thesis techniques. Introduction to two-port ladder and lattice s Three-terminal RC network synthesis approximation in the freque time domains. Prerequisite: EE 202 or permission of instructor. even years—evening)

216 **Linear Network Synthesis II** (3)
Advanced topics in passive one-port and two-port synthesis. Intro to n-port synthesis. Active network synthesis using negative re controlled sources, NIC, gyrator, operational amplifiers, and circ Synthesis of distributed integrated networks. Computer-aided optimization. Prerequisite: EE 215. (Spring, odd years—eve

221 **Physical Electronics I** (3)
Theoretical principles underlying the operation of electronic device sical mechanics and classical statistical mechanics, the quantum wave and matrix mechanics, quantum statistics. Prerequisite: EE equivalent. (Fall—evening)

222 **Physical Electronics II** (3)
The Boltzmann transport equation, band theory of solids, time-dep perturbation theory, group theory. Applications to semiconduct other solid-state devices such as transistors, tunnel diodes, maser lasers. Prerequisite: EE 221. (Spring—evening)

223 **Optical Communications Systems** (3)
Optical communication channels; survey of laser sources; modu line-of-sight links; system models and analysis; detection, photoem photodiodes, and photoconductors; noise mechanisms and signal analysis; optical fiber waveguides, electromagnetic field descript material, waveguide, and modal dispersion; optic fiber cabling, re and systems analysis; integrated optic components. Prerequisite: E 243. (Spring—evening)

224 **Electronics of Lasers** (3)
Basic concepts from quantum mechanics; Einstein coefficients;

and pumping mechanisms; rate equations. Resonators, He-Ne laser; organic dye lasers; injection lasers. Nonlinear interactions in lasers. Prerequisite: EE 222 or equivalent. (Fall, even years—evening)

225 **Nonlinear Electronics** (3)
Analysis and design of electronic components and systems operating as switching, sweeping, gating, and pulse generators; study of multivibrators, negative resistance devices and amplifiers, nonlinear operation of oscillators. Prerequisite: EE 201 or equivalent. (Fall—evening)

226 **Fiber and Integrated Optics** (3)
Single-mode and multimode propagation in stepped-index and gradient-index optical fibers: scattering and attenuation characteristics of fibers, phase velocity, group velocity, impulse response, energy transport, ray tracing, Goos-Haenchen shift, Hamiltonian formalism; directional couplers, modulators, and deflectors in fibers and surface films; coupled-mode theory. Prerequisite: EE 223 or equivalent. (Spring, odd years—evening)

227 **Industrial Electronics** (3)
Applications of electronic devices in industry; continuous and sampled control systems; induction and dielectric heating; timing and counting circuits; reliability and automatic checking equipment; digital control of machine tools. Prerequisite: EE 201 or equivalent and graduate status. (Spring, odd years—evening)

228 **High-frequency Electronics** (3)
Design and analysis of the operation of electron-tube, solid-state, crossed-field, space-charge wave, and quantum maser oscillators and amplifying devices that lay the foundation of modern-day communication systems. Prerequisite: EE 207 or equivalent. (Spring—evening)

229 **Precise Optical Measurements** (3)
Optical constants of lens systems; aberration; resolving power; illumination in focal plane; image evaluation, magnification, index of refraction; color and color temperature. Prerequisite: graduate status. (Fall—evening)

231 **Field Analysis and Potential Theory** (3)
General study of the theory of potentials as used to facilitate solution of problems in electromagnetic theory, mechanics, thermodynamics, optics, and gravitation. Emphasis on mathematical methods such as Green's functions, variational methods, principal axis transformations, and multidimensional Fourier transforms. Prerequisite: EE 207. (Fall, even years—evening)

232 **Electrodynamics** (3)
Special theory of relativity and the Lorentz transformation; Minkowski formulation. Maxwell's equations in the context of special relativity, electromagnetic potentials, and stress tensors. Lagrangian and Hamiltonian formulations, radiation from moving charges. Introduction to quantum electrodynamics. Prerequisite: EE 207. (Spring, even years—evening)

233 **Microwaves and Components** (3)
High-frequency transmission lines and guided systems; matching techniques; scatter ferrite isolators, gyrators; Faraday rotation; microwave networks; directional couplers; cavity resonators and microwave components. Prerequisite: EE 207. (Fall—evening)

234 Electromagnetic Wave Propagation (3)

Retarded time scalar, vector, and Hertz potential. Dipole and d array fields; Mie theory of electromagnetic scattering by spheres. P agation in electrically and magnetically anisotropic media such as di tric crystals, space-charge plasmas, and ferrites. Wave propagatio inhomogeneous media; Liouville transformation, Lagrange's variatio parameters, WKB solution, invariant imbedding techniques. Prop tion in stochastic and dispersive media. Prerequisite: EE 207. (O odd years—evening)

235 Antennas (3)

General solution of Maxwell's equations in terms of current sources, d far field approximations, radiation from current distributions, field equ alence theorems, the geometrical optics approximation, aperture ant nas, receiving antennas, the theory of arrays, and applications to specif antennas and antenna types. Prerequisite: EE 207. (Spring—evenin

236 Plasma Dynamics (3)

Study of the interaction of fluids with electromagnetic fields. Generaliz Navier-Stokes and energy equations, magnetogasdynamic and magne hydrodynamic approximations, boundary-layer theory, statistical theor of turbulence, generalized Von Karman-Howarth equation, Boltzmann transport equation. MHD generators and devices. Prerequisite: EE 20 (Spring, even years—evening)

237 Waves in Random Media (3)

Propagation and scattering of electromagnetic, optical, and acoust waves in random media, scattering from rough surfaces and random distributed particles, turbulence. Applications to propagation through rai and fog. Laser beam scintillations, remote sensing and communicatio channel modeling. Computer simulation by Monte Carlo techniques Prerequisite: EE 204, 207. (Fall, odd years—evening)

238 Precise Microwave Measurements (3)

Precise measurement of power, frequency, impedance, wavelength, and a tentuation at microwave frequencies; characteristics and Q of resonant de vices; calibration of microwave components; design of microwave experi ments. Prerequisite: EE 207 or equivalent. (Spring—evening)

239 Precise Electrical Standards (3)

Concepts of standards, errors; design of resistance, capacitance and in ductance standards; d-c voltage standards; frequency and time standards dielectric and magnetic materials, attenuation standards, power standards transfer standards. Prerequisite: EE 160 or equivalent. (Fall—eve ning)

241 Information Theory (3)

Measure of information, noiseless coding; communication channels, chan nel capacity, the noisy channel coding theorem; bounds on the performa ance of communication system; the Gaussian and binary symmetric chan nel; feedback communications systems; rate-distortion theory. Prerequ site: EE 204. (Fall—evening)

242 Coding Theory (3)

Error-correcting codes; bounds on the performances of error-correcting

codes, group codes; syndrome decoding; cyclic codes, their encoding and decoding; Galois fields; BCH codes, burst correction, and threshold-decodeable codes; performance calculations. Prerequisite: EE 204. (Spring—evening)

243 **Communication Theory I** (3)

Optimum receivers for vector channels and for the additive white Gaussian noise channel; correlation detectors, matched filters; coherent and noncoherent detection and their error probabilities for simplex, orthogonal, and coded systems; bounds on the performance of communications in Gaussian noise; comparison of communications systems. Prerequisite: EE 204 or equivalent. (Fall—evening)

244 **Communication Theory II** (3)

Schemes for efficient signaling for data sequences; effects of quantizing at the receiver; detection of such signals in colored noise; detection of stochastic signals; the innovations approach in detection and estimation problems; signaling over fading channels and the optimum receivers; diversity techniques and their performances. Prerequisite: EE 243. (Spring—day and evening)

245 **Signal Detection and Estimation Theory** (3)

Statistical detection theory, hypothesis testing, sequential detection, estimation theory, maximum likelihood and Bayes methods, estimation of signal parameters and continuous wave forms, Wiener and Kalman filters, applications to the design of optimum receivers, adaptive systems. Prerequisite: EE 241, 244; or equivalent. (Fall—evening)

246 **Digital Communications** (3)

Bounds on the performance of data communications; channels with high dispersion; intersymbol interference and its minimization; Nyquist criteria, eye openings, tail cancellation techniques, correlative coding, transversal equalizers, adaptive equalizers; broadband, noise limited channel; orthogonal codes, simplex codes, bounds on error probability; reception by matched filters, "Green machine," and other techniques; convolutional codes; decoding by sequential decoding and Viterbi decoding; performance analysis. Prerequisite: EE 241, 244; or equivalent. (Spring—evening)

247 **Communication Systems** (3)

Wiener filters, phase-locked loops and their optimization. Parameter estimation theory with application to optimum demodulation of analog wave forms (DSB-AM, SSB-AM, FM). Comparative analysis of analog modulation systems. Digital communication systems—coherent and noncoherent reception of binary and M-ary signals and their performance analysis. Frequency acquisition and synchronization. Prerequisite: EE 241, 244. (Fall—evening)

249 **Data Telecommunication Networks** (3)

Techniques for the analysis and design of data networks with store, forward, and message switching capability, queuing theory, Erlang's formula, priority systems; optimization based on minimization of message delay; synchronous and asynchronous multiplexing; topological problems, graph theory, connectivity and survivable networks, probabilistic graphs; data networks with a central computer; terminal oriented systems. Prerequisite: EE 205 or equivalent. (Fall—evening)

*250 **Telecommunication Systems Concepts** (3)

Essential elements of an electrical communication system, speech, data signals; spectrum, bandwidth, sampling. Amplitude, frequen pulse code modulation and comparative performance. Mul schemes, communication quality standards, and objectives. Signal noise power, distortion, and channel capacity. Probability, traffic reliability, voice, TV, and data transmission. Telecommunication wave radio, cable, and satellite communications systems. ranged)

*251 **Survey of Telecommunication Systems** (3)

Design of a communications link for voice, TV, and data. Load switched telephone network. Transmission system layout and m sign considerations. Over-all system design of microwave radio Radiowave propagation fundamentals. Satellite communications, affecting the choice of orbit and orbital separation of satellites, transponder. Major design consideration and values of significan meters for a typical satellite communications link. Over-all desi cable communication system. Digital transmission and terminals. band data transmission. Frequency allocation. (As arranged)

252 **Digital Signal Processing Techniques** (3)

Digital signal processing and data reduction techniques; applicat communications, controls, image enhancement, radar, and speech p ing. Least-squares fitting of polynomials; sampling and quantizatio cursive and nonrecursive digital filter design. Generation and sha pseudo-random noise. Estimation of correlation functions and densities. Digital processing for Kalman Bucy filters. Extraction of and timing from noise. Fast Fourier and Hadamard transforms. Sc and hardware implementation of signal processing algorithms. Pr site: EE 51 or equivalent; EE 204 and graduate status. (Fal ning)

253 **Sonar Systems** (3)

Underwater sound propagation; transducer and transducer arrays; tion, localization, and tracking techniques; array processing; time co sion correlation and digital processing of signals; effects of non geneous noise fields; applications to navigation and communicat the ocean environment. Prerequisite: EE 244. (Fall—evening)

254 **Radar Systems** (3)

The radar equation, range and resolution limits; MTI radars; detectio estimation techniques; clutter characteristics and detection in clutter; design; ambiguity functions; Doppler radar; phased arrays; synthetic ture techniques; digital and optical processing and computer control plications. Prerequisite: EE 206, 244. (Spring—evening)

255 **Optical Processing** (3)

Fourier transforms by diffraction of light, optical spectrum analysis cal memories and systems, holography and holographic techniques. erties and techniques for photographic reproduction. Prerequisite: EE (Fall, even years—evening)

* EE 250 and 251 cannot be applied toward a graduate degree in the School of Engineering Applied Science.

256 **Environmental Optics** (3)

Distribution of radiation: power converting and transferring systems; UV, luminous, IR spectral sources; daylight; moonlight; luminaries. Environmental boundaries—transmission, reflection, diffusion, refraction, diffraction, dispersion, bleaching, phototropy, polarization. Simulation of organismic responses: response definition—physiological, overt behavioral, perceptual, cognitive. Stimulus-response correlation model; correlating measurement concepts. (Spring—evening)

257 **Issues in Computer Communications** (3)

Fundamentals of data communications, systems, integrating computers and telecommunications, modems, multiplexers, concentrators and lines. Networks of computers: distributed and centralized. Network organization: circuit-switched, store-and-forward, and packet-switched. System design considerations; management factors; economic and regulatory issues; changes in technology; effect on systems cost-performance; regulation, value-added networks. (Spring—evening)

258 **Radio Communication Systems I** (3)

(Formerly EE 248 Microwave Communication Systems)

Analysis and design of microwave communication systems for terrestrial, satellite, and over-the-horizon scatter radio channels. Propagation effects and channel characterization including refraction, reflection, multipath, scattering, and absorption. Effects of earth curvature and characteristics of over-land and over-water propagation. Antenna considerations including gain, directivity, polarization, and antenna patterns. Frequency and time-division multiplexing and modulation techniques. Effects of noise, interference, and fading. Diversity techniques. Prerequisite: EE 206, 244. (Fall—evening)

259 **Radio Communication Systems II** (3)

Morphology of the ionosphere, propogation of ionspherically reflected radiowaves, anomolous ionospheric propagation mechanisms, linear antenna structures, atmospheric noise, digital modulation techniques, non-Gaussian channel performance, diversity, fading channel error control, typical VLF, LF, and HF system design. Prerequisite: EE 258 or permission of instructor. (Spring—evening)

261 **Electromechanical Energy Conversion** (3)

Characteristics of synchronous machines, synchronous reactance, reactance theories, synchronizing generators and parallel operation of machines, characteristics of asynchronous machines, machines as circuit elements, steady-state and dynamic performance of alternating current machines. (Fall—evening)

264 **Direct Electrical Energy Conversion** (3)

Theory and practice for direct production of electricity using solar cells, thermionic converters, fuel cells, and batteries. Concepts of solid state energy bands, work function and conversion efficiency, and limitations. (Spring—evening)

265 **Electrical Power Production** (3)

Production of electrical power from primary energy sources. Use of hydrocarbon fuels in the production of steam; hydroelectric generation and tidal variations as primary energy. Geothermal energy, nuclear fission,

magnetohydrodynamics, fusion and solar concentrators as prima sources. (Fall, odd years—evening)

266 **Electrical Power Transmission and Distribution** (3)

Transmission line characteristics, exact and approximate equiv cuits; line configurations; standing waves, filtering and protect voltage lines; equivalent circuits of transformers, line losses, design, d.c. transmission, distribution systems. (Spring, even evening)

267 **Power Networks** (3)

Symmetrical components, short and opened circuit analysis of p works, stability of electrical grids, fault analysis, network reliab quency control, load flow analysis. Prerequisite: EE 266. (years—evening)

269 **Issues in Electrical Power Systems** (3)

Load flow analysis of large power networks, economic consider network topology; optimal network layout; rate structures, cost of energy, plant locations, environmental considerations in networ and operation. (Spring, odd years—evening)

272 **Discrete Systems** (3)

Sampling processes and theorems; Z-transforms and modified Z-tra responses of discrete systems using transformation techniques equations; stability criteria; design of digital controller for discrete Prerequisite: EE 203 or equivalent. (Spring, even years—

273 **System Optimization** (3)

Parameter optimization problems; theory of minima and maxima. zation problems for dynamic systems; calculus of variations; the m principle and the Hamilton-Jacobi equation. Optimization proble constraints; optimal feedback systems. Numerical solution of optim lems. Prerequisite: EE 203 or equivalent. (Fall—evening)

274 **Nonlinear Systems** (3)

Definition of linear and nonlinear systems; introduction to appr analysis of nonlinear systems—describing functions, Krylov and bov's asymptotical method and Tsypkin's locus. Forced oscillation resonance. Stability analysis—Liapunov's criterion, Luré's proble Popov's method. Prerequisite: EE 203. (Spring, odd years—

275 **System Identification and Adaptive Systems** (3)

Introduction to the adaptive problem and practical applications. mining the mathematical representation of systems—the ident problem. Optimal estimation of states in the presence of uncer Adaptive systems. Prerequisite: EE 203, 204; or equivalent. even years—evening)

276 **Cybernetics** (3)

Principles of machines or mechanisms made by men or nature with to their ways and forms of possible behaviors: regular, determi reproducible; fundamental concepts of finite differences; chang transformations as sets of transitions, leading to stability and fo statistical concepts of complex systems and blackbox theory; Sh information theory; regulation and control of mechanisms. Prere EE 204 or equivalent. (Fall, odd years—evening)

277 Space Communication Systems (3)

Theoretical and application aspects of space communications, as related to communication satellite systems, scientific satellites, manned space missions, and deep space missions. Prerequisite: EE 244. (Fall—evening)

278 Spacecraft Systems Design (3)

Space environment; structure, propulsion, control, and instrumentation of spacecraft—launch, orbit, transit, and re-entry problems; bioastronautic considerations. Prerequisite: graduate status. (Spring, even years—evening)

281 Medical Instrumentation I (3)

Theory of measurements in biological areas, techniques for electronic measurements on biological specimens, current problems in medical metrology stressing electronic systems. Prerequisite: EE 283 or permission of instructor. (Fall—evening)

282 Medical Instrumentation II (3)

Medical telemetry systems, medical use of the computer, engineering techniques in patient treatment, principles of good medical instrumentation. Prerequisite: EE 283 or permission of instructor. (Spring—evening)

283 Introduction to Medicine for Engineers I: Physiology and Anatomy (3)

Designed to acquaint the engineering student with the physiology of the human body; material based on the curriculum of the School of Medicine and taught from a systems viewpoint; concepts of cellular structure and function integrated into the tissue and organs, which are then related to the various systems of the body; interrelationships of the body systems, i.e., the interaction of the nervous system with the musculoskeletal system or the interaction of the respiratory system and its functions with the cardiovascular system. (Fall—evening)

284 Introduction to Medicine for Engineers II: Clinical Medicine (3)

Clinical aspects of medicine. Further elaboration of physiological systems, such as the endocrine system, renal physiology, gastrointestinal physiology, and others; the separate systems of the body are integrated to present the functioning of the body as an over-all system; considerable interaction with physicians and other medical personnel. Prerequisite: EE 283. (Spring—day)

285 Engineering in Physical Medicine and Rehabilitation (3)

Application of engineering theory and techniques to the rehabilitation of handicapped persons: major problem areas and general approaches, as well as specific solutions. Offered cooperatively with personnel from the Social and Rehabilitation Services Administration. Prerequisite: EE 284. (Fall—evening)

286 Sensory Evoked Potentials I (3)

Physiological significance of the sensory evoked potential, stimulation variables, subject variables, data acquisiton procedures and instrumentation, signal-averaging computers, analysis techniques for the VEP, applications of the VEP. Lectures, discussion, and laboratory. Prerequisite: EE 281, 282, 283, 284; or permission of instructor. (Fall—evening)

287 Computer-aided Analysis of Physiological Signals (3)

Computer analysis of physiological data obtained from the cardiovascular,

pulmonary, and nervous systems. Sources and detection of va
obtained from these systems; algorithmic techniques applic
analysis of these signals; students provided with real data, ob
hospital patients, and required to develop computer softwar
mining pertinent medical parameters as established by phys
requisite: EE 281, 282, 283, 284; and a working knowled
TRAN. (Fall—evening)

288 **Physiological Controls and Systems** (3)

Some applications of control and systems theory in the medi
logical fields. Application of general control and systems theor
to physiological systems. Specific applications of control s
theory to the visual system, respiratory system, cardiovascu
and musculoskeletal system. Prerequisite: EE 172 or equivale
282, 283, 284. (Spring—evening)

289 **Clinical Engineering** (3)

A cross-sectional view of clinical engineering applications, fun
ations, and patterns in the medical and allied health-care ar
instrumentation, computers, and systems by clinical engineers
and clinics. The clinical engineer in cardiovascular measurem
and intensive care units; other areas where functional usage
engineering is applicable. Prerequisite: EE 281, 282, 283.
evening)

298 **Research** (arr.)

Research as arranged. May be repeated for credit. (Fall a

299–300 **Thesis Research** (3–3)
(Fall and spring)

319 **Systems Science, Networks, and Controls Research** (arr.)
(Formerly Networks Research)
Limited to students preparing for the Doctor of Science qualify
nation. May be repeated for credit. (Fall and spring)

323 **Principles of Microelectronics** (3)

Basic principles, techniques, and processes necessary for und
microelectronics. Semiconductor physics, phase diagrams, cryst
epitaxy, vacuum techniques, thin-film deposition, diffusion,
junction formation, masking, and properties of thin films and
Prerequisite: EE 222 or equivalent. (Fall, odd years—even

329 **Electrophysics Research** (arr.)
(Formerly Electronics Research)
Limited to students preparing for the Doctor of Science qualifyi
nation. May be repeated for credit. (Fall and spring)

345 **Advanced Detection Theory** (3)

Review of general estimation equations. Linear estimation; W
Kalman-Bucy filters; nonlinear modulation theory; angle-modul
tems, analysis and design of phase-lock loops, optimum angle-mo
rate distortion theory; Gaussian processes in Gaussian noise, dete
parameter estimation, canonical receivers, structures, and perform
culations for diversity systems, multiple pulse radars, stationary
and threshold receivers. Prerequisite: EE 245. (Spring—eve

349 **Communications Research** (arr.)

Limited to students preparing for the Doctor of Science qualifyin
nation. May be repeated for credit. (Fall and spring)

371 Simulation Methods for System Analysis (3)

Survey of simulation languages. Techniques of model building for material- and machine-based systems. Treatment of these systems with notion of transactions and states. Modeling the dynamic processes of growth problems. Analog, hybrid, and digital methods for simulation treated by means of case studies; speed and cost of alternate computing procedures. Project-type problems used to illustrate simulation methods. Prerequisite: CSci 278 or permission of instructor. (Fall, odd years—evening)

372 Analysis and Control of Large Systems (3)

Systems as multistage decision processes. Analytical concepts of model-making and matrix representations of large systems. Approximation by models of lower dimension—reduction to simplified models; decentralized systems. Differential games; computation of saddle points; construction of an equilibrium point. Prerequisite: EE 273. (Spring, even years—evening)

381 Bioelectric Phenomena (3)

Mathematical treatment of selected bioelectric phenomena. Membrane thermodynamics; membrane electrical potentials and subthreshold membrane effects; membrane dynamics. Solid-state phenomena in biology and medicine. Photoconduction. Mechanism of nerve propagation. Electrical models of the heart. Cell physiology. Quantum effects in biological systems. Prerequisite: EE 206, 281, 282, 283. (Fall—evening)

386 Sensory-evoked Potentials II (3)

A continuation of EE 286. Advanced lecture, discussion, and laboratory. Current topics in sensory-evoked potentials research; emphasis on clinical applications. Planning and conducting an advanced (clinical or research) project chosen to take maximum advantage of the student's technical background from an instrumentation, computer, and data analysis viewpoint. Prerequisite: EE 286 and permission of instructor. (Spring—evening)

389 Medical Engineering Research (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

Computer Science Graduate Courses

201 Introduction to Computer Systems I (3)

Introduction to programming digital computers in a macro-assembly language and higher-level procedural languages; techniques in machine control and memory addressing. Characteristics of different computer structures and the programming of such machines Introduction to the structure of compiler languages; parsing of compiler language statements. Characteristics and choice of data processing languages. Prerequisite: CSci or EE 51 or equivalent, assembly language programming experience, and permission of instructor. (Fall and spring—evening)

202 Introduction to Computer Systems II (3)

Introduction to combinational and sequential logic networks; analysis and synthesis of switching circuits using Boolean algebra; minimization techniques in the design of logical circuits; number systems and arithmetic in digital computers, digital computer architecture and the design of functional sub-units; design of memory, arithmetic, and units comprising a digital computer; information flow, timing, and control in large scale computers. Prerequisite: CSci 201 or permission of instructor. (Spring—evening)

208 Computer Programming (3)

Use of a macroassembler in structured programming. Input-output programming at the assembly level. Conditional assembling, access methods and storage management. Memory management and I/O buffer pools. Introduction to the operating system, job control language, file structures. Program status and control, interrupt handling, reentrant and recursive subroutines. Prerequisite: CSci or EE 158, or CSci 201; or permission of instructor. (Spring—evening)

213 Discrete Structures in Computing (3)

Introduction to discrete mathematical structures used in computing: sets, graphs, functions, mappings, lattices, groups, and semigroups. Combinatorial problems and enumerations. Finite-state machines, representation, identification, transitions, and reductions. Directed graphs, trees, and paths through a program. Regular expressions and relations between programs and computing machines. Prerequisite: CSci 51 and permission of instructor. (Fall—evening)

214 Data Structures (3)

Computer data structures; arrays, items, pointers, lists, insertion and deletion, available space management, threaded lists, two-way lists, garbage collection and compactification. Push-down stacks, strings and files. Tree structures and searching; hash table searches, bubble, radix, and tree sorting. Sequential, index-sequential and random files; access methods; sorting of files. Subroutines, co-routines, macros, flags, relocation and recursion. Buffer pools and buffer management, data management, storage. List and string processing languages. Prerequisite: CSci 158 or 201; 213. (Spring—evening)

216 Information Retrieval Systems (3)

Information organization and retrieval of natural language data by digital computer systems; statistical, syntactic, and logical analysis of natural language used for retrieval systems; dictionary systems including thesaurus, look-up and phrase structures; searching strategies and cataloguing. Input preparation and output structures; large-scale file structures and operating systems required for their use. Prerequisite: CSci or EE 159, or CSci 214; or permission of instructor. (Spring—evening)

219 Interactive Computer Graphics (3)

Display devices, CRT, point plotting and vector generation, character generators; display files, data structures, linear and area transformations, mapping and windows; graphic input devices; interrupt handling; scaling, perspective, projection, hidden line elimination; command languages, time-shared interactive graphics, software support. Prerequisite: CSci or EE 159, or CSci 214; or permission of instructor. (Fall—evening)

220 **Pattern Recognition** (3)

Applications of pattern recognition, vector spaces, estimation and samples; Bayes estimation; density functions; stochastic approximation; decision rules in pattern recognition, minimal risk, Gaussian filters; bounds of risk, nearest-neighbor decision rules; clustering techniques, feature extraction, pattern recognition with *a priori* knowledge. Prerequisite: EE 204, CSci 214. (Spring—evening)

223 **Simulation and Heuristics** (3)

Techniques of deterministic and probabilistic simulation on the digital computer. Mathematics for simulation; design of systems modules; random number generation and testing. Markovian and bounded context systems; generation of stochastic variates; Monte Carlo techniques; heuristics; verification techniques; simulation languages. Prerequisite: CSci or EE 158, or CSci 201, and permission of instructor. (Fall—evening)

227 **Management Information Systems and Data Base Management** (3)

Concepts in management information systems. Commercial programming features of COBOL and PL/I. Inverted files and query systems. Editing, report generation, updating, and updating load. Tradeoff between direct access and indexed-sequential access. Maintaining large programming systems which lead to the need for data base management systems; construction of data base management systems. Survey of some existing data base systems. Relational data base concepts and future developments. Students will create and update a data base and interface to application programs. Prerequisite: CSci 208, 214. (Fall—evening)

232 **Automata Theory** (3)

(Formerly Finite Automata)

Regular expressions including equality and transformations between sequential machines and regular expressions. Turing machines, recursive function, predicate calculus, and computability. Complexity of algorithms. Formal language theory including grammatical construction, recognizers, relationships between machines and grammars, and ambiguity. Random processes in sequential machines. Prerequisite: CSci 213. (Spring—evening)

237 **Computing Systems** (3)

Organization of large digital computer systems. Design of high-speed arithmetic units. Random access and associative memories; rotational storage devices; computer control and interrupt structures. Input-output channels and interfacing problems. Communications in digital computers. Introduction to multiple access and time-sharing systems. Prerequisite: CSci or EE 154 or CSci 202. (Fall—evening)

239 **Comparative Computer Systems** (3)

Structures of computers and a general language for system description. History of different computer structures. Development of the operating system. Special purpose processors. Multiprocessors and large computing systems. Computer networks and time-shared systems. Comparison of computer families. Characteristics and philosophies of computer design of the major manufacturers. Introduction to performance evaluation and measurement. Effects of software and technology on computer structures. Prerequisite: CSci 237, 263. (Spring—evening)

240 **Theory and Practice of Microprogramming** (3)

Basic concepts, techniques, and theory of microprogramming as applied to the implementation of control systems for sequential machines. Micro-

programming languages, assemblers, and hardware simulators, in specific applications of these to the design of current computer and their interfaces with real-time systems. Prerequisite: CSci 23 (Spring—evening)

245 Advanced Computer Systems Theory I (3)

Analytical models applied to computing systems. Determinance, locks, concurrency, and synchronization of computer processes. O task scheduling using linear graph theory. Concurrent processes in processors. Analysis of the overlap of I/O and CPU processing. Q theory applied to time-shared computer models. Analysis of seve storage devices and effective data rate. Analysis of memory buffer and multiprogrammed memory allocation. Memory allocation an age heirarchy operation and their effect on throughput and res time. Prerequisite: EE 204; CSci 237, 263. (Fall—evening)

246 Advanced Computer Systems Theory II (3)

Optimum secondary storage placement algorithms to improve throug Modeling of secondary storage operation and data staging. Analy memory allocation algorithms to improve system performance. Ch teristics of computer system hardware and software to provide for processing, multiprogramming, and time-shared operation. Loosel tightly-coupled multiprocessors. Analysis of front-end processors t base operation and computer networks. System analysis of a large shared, terminal-oriented transaction processing system. Prerequ CSci 245. (Spring—evening)

255 Formal Languages, Correctness, and Structured Programming (3

Introduction to formal computer languages. Structured program and block-oriented languages. Regular, context-free, context-sensitive unrestricted computer grammars. Parsing a language, syntax of langua pushdown automata and their use in compiling. Top-down stru programming. Avoidance of GO TO statements. Correctness, termina and equivalence of programs. The inductive assertion method. Termi tion methods based on well-ordered sets. Assertion languages, prog schemes, fixed point methods, and inductive principles. Prerequisite: C 214. (Fall—evening)

256 Design of Translators (3)

Design of procedure-oriented computer languages. Semantics and pr matics as they affect the design of translators, interpreters, and compi Top-down and bottom-up recognizers. Production of machine co Syntax-directed compiling. Tables and their organizations in translato Optimizing compilers; compiler-compilers. Prerequisite: CSci 255. (Spring—evening)

263 Digital Computer Programming Systems (3)

Design of computer systems software. Design and programming of assembler and loader. Multiprogrammed job control including lan loading, linkage-edit, relocatability, region size, and status switching. sign of dispatchers and monitors. Design of utility programs. Input programming and control. Communications between components of operating system. Prerequisite: CSci 208, 214. (Fall—evening)

267 Operating Systems I (3)

Introduction to the operating system for batch-operated multiprogramm

computer systems. Software components which constitute the operating system. Facilities of the macro-assembler which utilize the operating system; loading and linking routines; initializing programs and tasks; dispatching and the interrupt mechanisms. Memory management in fixed and variable partitions; device and storage management. Input-output control and use of access methods. Performance evaluation of a multiprogrammed batch-operated system. Prerequisite: CSci 263. (Fall—evening)

268 **Operating Systems II** (3)

Introduction to operating systems for time-shared and multiprocessor computer systems. Processor management in a multiprocessor system; deadlocks, processor utilization, and I/0 management. System availability and fail-soft mechanisms. Time-slicing and time-sharing operating systems and subsystems; transaction processing subsystems; memory management in a paged and segmented virtual memory system. Performance of the operating system. Computer network software and an introduction to the computer as a utility. System security and large data base systems. Prerequisite: CSci 267. (Spring—evening)

278 **Analog and Hybrid Computers** (3)

Analog computer components and electronics. Slow analog computer solutions of linear and nonlinear differential equations. System simulation and modeling on the analog computer. Introduction to the iterative analog computer. Transfer function simulation and use in control theory. The hybrid computer, digital logic and digital computer control. Digital-to-analog and analog-to-digital converters and interfaces. Optimization methods on a hybrid computer. Parameter variations and searching methods. Prerequisite or concurrent registration: CSci or EE 154 or CSci 202; or permission of instructor. (Fall—evening)

281 **Applications of Numerical Methods I** (3)

Basic numerical methods with emphasis on their application to engineering problems. Error sources and error control; numerical representation of functions; over-determined systems; eigenvalues and eigenvectors; introduction to nonlinear equations; initial value and boundry value problems for ordinary differential equations. Theoretical concepts such as order of accuracy, Richardson's extrapolation, norm, stability, and convergence. Some modern methods such as spline approximation and the QR algorithm for eigenvalues. (Fall—evening)

282 **Applications of Numerical Methods II** (3)

A continuation of CSci 281. Systems of nonlinear equations; numerical optimization; numerical solution of common partial differential equations of engineering; methods for hyperbolic, parabolic and elliptic problems; introduction to finite element methods. Prerequisite: CSci 281. (Spring—evening)

[a]285 **Approximation of Functions and Data Representations** (3)

Review of linear spaces; least squares, orthogonal functions; nonlinear techniques, gradient search methods; parameter estimation with discrete data; Tchebysheff approximation; approximation and curve fitting by spline functions and Bernstein polynomials. Prerequisite: CSci 281. (Fall—evening)

[a]ffered at NASA-Langley Research Center; may be offered on campus when arranged.

286 Numerical Methods in Engineering I (3)

Computational methods for solution of systems of linear algeb
tions and for the solution of the algebraic eigenvalue problem.
on accuracy and efficiency. Methods for banded and other sp
tems. Methods for parallel and pipeline processer computers.
site: CSci 281 and knowledge of linear algebra. (Spring—

287 Numerical Methods in Engineering II (3)

Computational methods for solution of systems of ordinary d
equations: single-step methods, general multistep methods; co
and stability analysis, methods for stiff equations, step size co
control of order. Prerequisite: CSci 281 and knowledge of d
equations. (Spring—evening)

288 Numerical Methods in Engineering III (3)

Computational methods for solution of boundary value problem
ordinary and partial differential equations: shooting methods,
ference methods, functional approximation methods, invariant i
method of lines, treatment of boundaries in multidimensional
Prerequisite: CSci 282 and knowledge of differential equations.
—evening)

289 Numerical Methods in Engineering IV (3)

Computational methods for solution of initial value problems
differential equations: method of lines, consistency, stability, co
explicit and implicit finite difference methods, alternating direct
ods, high-order methods. Prerequisite: CSci 282 and knowledge
differential equations. (Fall—evening)

298 Research (arr.)

Research as arranged. May be repeated for credit. (Fall a

299–300 Thesis Research (3–3)

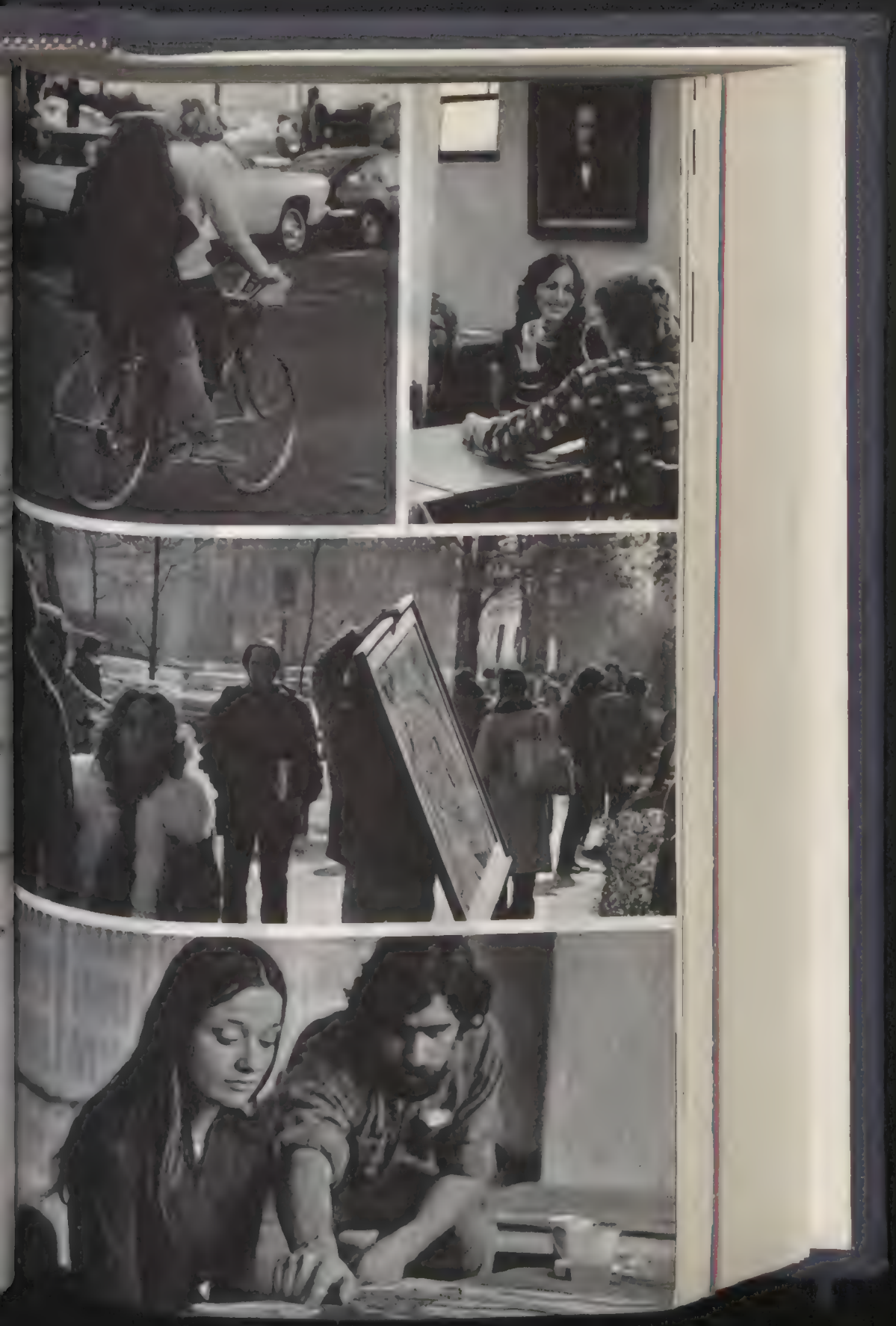
(Fall and spring)

391 Computer Science Research (arr.)

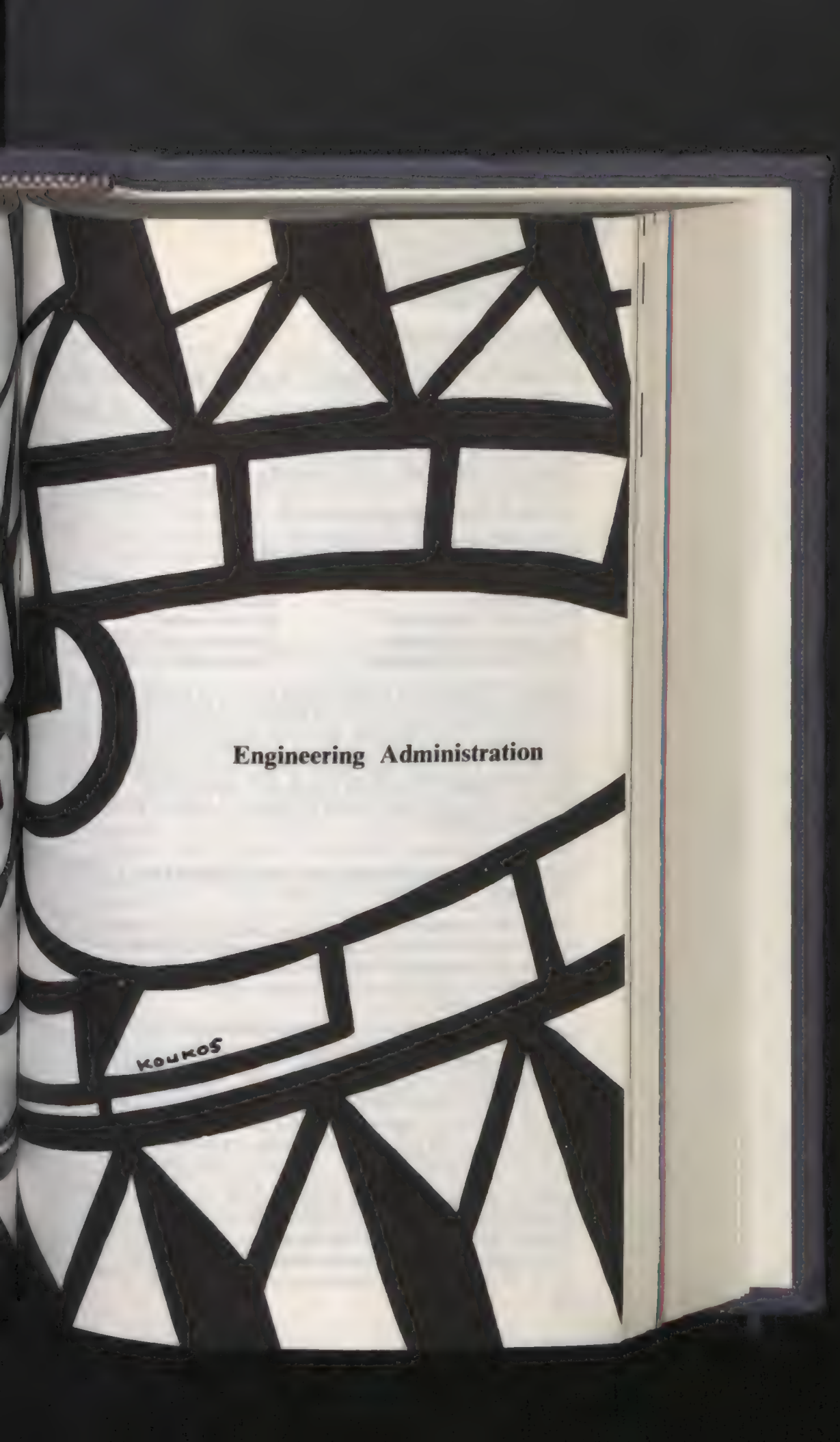
Limited to students preparing for the Doctor of Science qual
amination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated
(Fall and spring)







Engineering Administration

Engineering Administration

Professors P.A. Crafton, P.S. Shane, J. Kaye, M. Apstein *(Research)*, S. B
man *(Chairman)*
Professorial Lecturers B.B. Bright, G.M. Coburn, J. Gupta, J.S. Pachter
Associate Professor J.B. Smith, Jr.
Associate Professorial Lecturers J.E. Just, E. Volgenau, R.L. Paullin, A
Kontaratos, D.R. Levin, A.G. Hoshovsky
Assistant Professorial Lecturers R. Sears, W.A. Goetz, L. Lipson, A.L. D
brosio, R. Doyon, R.J. Lynch, Jr., P.G. O'Neill

Graduate Fields and Areas of Concentration

Administration of Research and Development
Construction Management
Engineering Administration
Environmental Management
Management Information Systems
Marketing of Technology
Systems Analysis
Technology and Public Affairs
Transportation Management

Programs in Engineering Administration lead to the degrees of Master of E
neering Administration, Professional Degree, and Doctor of Science. Prog
in Administration of Research and Development, Construction Manage
Environmental Management, Management Information Systems, Marketi
Technology, Technology and Public Affairs, and Transportation Manage
lead to the degree of Master of Engineering Administration. Programs in
tems Analysis lead to the degrees of Master of Science, Professional Deg
and Doctor of Science.

THE MASTER OF ENGINEERING ADMINISTRATION DEGREE PROGRAM

The principal objective of the program leading to the degree of Master
Engineering Administration is to prepare students whose undergraduate edu
tion was in engineering, mathematics, or science for positions of manage
responsibility in technological and scientific organizations in industry, gove
ment, or the armed services.

The program is designed to help the student achieve a broad understanding
the administrative process. Although years of experience are required to develo
the skills, insight, and mature judgment which distinguish an effective mana
in technological and scientific organizations, a graduate professional manage
ment curriculum can give the student an effective start as a manager. The c
riculum provides an opportunity to gain an understanding and to develop
ful managerial skills in the functional areas of engineering administration
of the major purposes is to assist the student in forming the habit of examin
problems from an over-all administrative point of view. The individual's
particular experience, and the explicit process of relating this experience
graduate study, provides each student with a personal frame of reference
interpret management in a rapidly changing world.

Successful education for engineering administration implies an underst
ing of what it is that an engineering manager must do, an analysis of

oad functions involved in management, and a detailing of modern methods eful in making and executing decisions in the management of technological d scientific organizations. It is the aim of the School, therefore, to keep alive pirit of general inquiry and a decision-making orientation.

The management of technological organizations is one of the most difficult allenges of our times. The professional engineering manager today must unrstand not only currently developing technologies but also the rapidly changg marketplace where these technologies are applied for society's benefit. The gineering administrator is the link between these dynamic technologies and the eds of society in general.

In summary, the program of study has for its objective an educational exrience which will contribute to the development of managers possessing a mbination of technical know-how and administrative skill.

MISSION

addition to the requirements for admission to graduate study (see pages 24–, applicants for programs leading to the degree of Master of Engineering Adnistration must meet the following requirements: (1) The applicant must ve an adequate knowledge of the principles of human relations, the funmentals of engineering economic analysis, and the fundamentals of quanative methods. This requirement can be met by satisfactory completion of following undergraduate courses or approved equivalents: EAd 150, *Introction to Engineering Administration;* EAd 160, *Introduction to Engineering onomic Analysis;* and EAd 170, *Basic Quantitative Methods for Engineer Administration.* (2) The applicant may be required to complete other ungraduate prerequisite courses prescribed as a condition of admission. (3) student is required to earn the grade of *C* or better (unless the requirement stipulated to be a grade of *B* or better upon admission) in each underduate prerequisite course. If this scholarship requirement is not met the dent is barred from further enrollment. A student is not permitted to repeat y of the undergraduate prerequisite courses. Credit for prerequisite courses not applicable toward the degree of Master of Engineering Administration, d all prerequisite courses must be completed prior to taking graduate courses this degree program.

dministration of Research and Development

e program is designed to prepare students for responsible managerial posis in organizations conducting technological or scientific research and deopment and in organizations planning and administering programs of techogical or scientific research and development.

QUIRED COURSES

program is prescribed for each student in conference with an adviser. Stunts are required to complete EAd 207, 211–12,* 255, 269,* and 299–300 r those electing the thesis program) or 297 (for those not electing a thesis); e remainder of the program is selected from courses in the Department of gineering Administration.

Construction Management

Construction Management encompasses those managerial functions in the organization that plans and executes major construction work. This can take place in the field, in the project office, or in a main office. Due to the increasing complexity of present-day engineering, engineers need to know management as well as basic planning, design, and construction methods. They need to know construction developments, problems of contracts and specifications, techniques of scheduling and control, estimating, labor relations, and industrial engineering psychology.

This program prepares the engineer for the task of marshalling men, materials, machines, and money as functions of time, cost, weather, and the nature to plan and build structures.

REQUIRED COURSES

Students are required to complete EAd 211–12,* 241, 242, 261, 269,* 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected, with the approval of the student's adviser, from courses in the Department of Engineering Administration, the Department of Civil, Mechanical, and Environmental Engineering, and other departments of the University.

Engineering Administration

Study in engineering administration provides the conceptual depth in management practice and knowledge needed by technical and scientific personnel who are confronted with increasing demands and mounting complexities. Technical knowledge is complemented by an understanding of theory and practice in management action. Engineering management is a logical development in a technological society. The program is designed to provide engineers with knowledge and proficiency in the administration of engineering and science. It emphasizes use of deliberative, purposive study of general administrative problems and opportunities, as well as the study and use of specific knowledge and methods needed to solve administrative problems and to exploit opportunities.

REQUIRED COURSES

Analysis, case study, and quantitative approaches are emphasized in advanced technical reviews of administration. A program is prescribed for each student in conference with an adviser. Students are required to complete EAd 211–12, 269,* and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is elective. EAd 211–12 and 269 must be taken prior to the elective courses, except that in certain cases permission may be obtained for concurrent registration. Electives are chosen from the Department of Engineering Administration and other departments of the University, but no more than two courses may be chosen from other departments.

* EAd 211–12 and 269 must be taken at the beginning of the program of study

Environmental Management

This program prepares students for responsible managerial positions in organizations conducting environmental control and in organizations planning and administering programs in the prevention and control of environmental pollution.

REQUIRED COURSES

Students are required to complete EAd 211–12,* 221–22, 261, 269,* and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected, with the approval of the student's adviser, from appropriate courses in the Department of Engineering Administration, the Department of Civil, Mechanical, and Environmental Engineering, and other departments of the University.

Management Information Systems

This program provides the developing manager in technological and scientific organizations with the understanding and competence in the managerial use of systems that furnish management information in the variety of forms required for day-to-day operations and long-range decisions.

REQUIRED COURSES

Students are required to complete EAd 211–12,* 269,* 295, 321, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration, and, with the approval of the student's adviser, in other departments of the University.

Marketing of Technology

As the American economy matures and Americans survey the spectrum of options available to them, it is apparent that scientific and engineering outputs must be sold in world-wide competition both at home and abroad. The trained specialist is becoming more important than ever before in performing the sell-ing function.

The objective of this program is to prepare students for responsible positions in marketing technical products and services.

REQUIRED COURSES

Students are required to complete EAd 211–12,* 269,* 293, 294, 311, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration.

* EAd 211–12 and 269 must be taken at the beginning of the program of study.

Technology and Public Affairs

This program prepares students for responsible positions requiring ma
decision-making on matters that involve the impact of technology o
policy and that concern the general interrelationship between mode
nology and public affairs.

REQUIRED COURSES

Students are required to complete EAd 211–12,* 269,* and 299-3
those electing a thesis) or 297 (for those not electing a thesis); the re
of the program is selected, with the approval of the student's adviser
courses in the Department of Engineering Administration, and other
ments of the University.

Transportation Management

The Transportation Management program prepares students for resp
positions in the management of transportation systems or the formula
transportation policy.

REQUIRED COURSES

Students are required to complete EAd 211–12,* 265, 266, 269,* and
300 (for those electing a thesis) or 297 (for those not electing a thesis
remainder of the program is selected from courses in the Department of
neering Administration, and with the approval of the student's adviser, in
departments of the University.

THE MASTER OF SCIENCE DEGREE PROGRAM

Systems Analysis

This program leads to the degree of Master of Science and is administered
the Department of Engineering Administration.

The program in Systems Analysis prepares students whose undergra
training is in engineering, mathematics, or science for responsible positio
the practice of systems analysis.

ADMISSION

The admission requirement for the Master of Science degree in Systems An
sis is a bachelor's degree in engineering, mathematics, or the natural scie
from a recognized institution. An applicant may be required to complete
dergraduate prerequisite courses prescribed as a condition for admission. S
courses are not applicable toward the Master of Science degree and must
completed prior to taking any graduate courses in this program.

* EAd 211–12 and 269 must be taken at the beginning of the program of study.

REQUIRED COURSES

Students are required to complete EAd 281–82, 283, 284, and 299–300 (equivalent to 6 semester hours for those electing a thesis) or 9 semester hours of approved courses (of which one must be EAd 297) in lieu of EAd 299–300. The remainder of the program is selected, with the approval of the student's adviser, from courses in the Department of Engineering Administration and other departments of the University.

EAd 281–82, 283, and 284 must be taken prior to any other courses in this program of study.

THE PROFESSIONAL DEGREE PROGRAM

The Department of Engineering Administration has established the Professional Degree program for those students who are interested in pursuing course work beyond the Master's degree, with emphasis on applied subject material rather than research. The program leads to the degree of Applied Scientist or to the degree of Engineer and has been designed to meet the needs of industry and government for highly prepared personnel in engineering administration.

In the Professional Degree program, emphasis is on increasing the student's knowledge, understanding, and skill by concentrating on principles and their application. This approach provides the individual with flexibility to adapt successfully to changing circumstances.

Each student's program is planned considering background and needs, subject to departmental requirements.

Professional Degree Study Programs

The Professional Degree program provides post-Master's degree graduate study in areas in which the Department has adequate facilities and resources. Upon departmental approval, the student may select courses in other University departments to meet specific needs or objectives. Courses can, upon departmental approval, be chosen from the following areas of concentration:

Administration of Research and Development
Construction Management
Engineering Administration
Environmental Management
Management Information Systems
Marketing of Technology
Systems Analysis
Technology and Public Affairs
Transportation Management

A student's program of study will provide concentration in a selected area, and include courses from other areas. A program consists of a minimum of 30 semester credit hours of approved graduate courses beyond a Master's degree, of which are devoted to a professional project. Students whose prior study does not include specified prerequisites may be required to take more than the minimum number of credit hours.

ADMISSION

Admission to graduate study toward the Professional degree requires appro-

priate bachelor's and master's degrees from recognized institutions, and
dence of capacity for productive study. To study toward the Professiona
gree of Engineer (in Engineering Administration), an applicant must pos
a bachelor's degree in engineering; for the Professional Degree of Apl
Scientist (in Engineering Administration), an applicant must possess a ba
lor's degree in mathematics or a natural science. In both cases a mas
degree in engineering administration or a related field is required. Appli
having equivalent backgrounds of study may be considered. Normally at
3.00 average in graduate study is required.

ADMISSION TO CANDIDACY

An applicant is admitted to candidacy for the degree after he has: (1) sati
torily cleared any prerequisite requirements and conditions, and (2) exhi
superior performance on the Comprehensive Examination for the Mast
Engineering Administration or Master of Science (Systems Analysis) degre
appropriate. No courses taken by the applicant to meet these prerequisite
quirements and conditions can be applied toward the Professional degre
maximum of only 9 credit hours of course work taken in the interval betw
admission to study and admission to degree candidacy can be applied tow
meeting degree requirements, with approval of the academic adviser.

TRANSFER CREDIT

Up to 6 semester credit hours of satisfactory study (with grades of *A* or
in a graduate program beyond a master's degree will be considered for tran
toward the Professional degree. They must have been earned within five ye
of admission to candidacy for the Professional degree, and must be appropr
to satisfy requirements for the Professional degree. The student must, w
the approval of the adviser, petition the Department chairman for such tran

PROGRAM OF STUDY

Upon admission the student is assigned a faculty adviser. A program of st
is drawn up considering any deficiencies at admission, preparation for the C
prehensive Examination, and Professional degree requirements. The progr
of study for each student must be approved by the student's adviser and
Department chairman. An area of concentration is selected to prepare the
dent to undertake the professional project. Other courses are selected ac
to support work on the planned projects or to meet other needs. With
approval of the adviser, up to 9 credit hours of study may be taken in co
departments of instruction in the University if such work is pertinent to
program.

PROFESSIONAL PROJECT

Each degree candidate must submit an acceptable report of an analysis
solution of a "real world" problem in engineering administration, which is
professional project. The student is to demonstrate ability to apply
acquired knowledge to identify a problem situation, determine a signific

problem, work toward a solution, and communicate the results in writing.

When the course work is essentially completed, the candidate with the adviser's approval, will register for EAd 395–96 *Seminar: Professional Project* (3–3) to receive guidance in the professional project. Before registration the candidate should have identified an area or project to study, and prepared a study proposal, including consideration of the feasibility of the proposed effort. Shortly after registration for work on the project, the candidate must submit a detailed project proposal to the Department chairman, with approval of the project adviser. Six semester credit hours are assigned for work on the project.

SCHOLARSHIP

No student studying for the Professional degree may receive more than two course grades below *B*. If the student does receive more than two course grades below *B*, study is terminated and his further enrollment is prohibited. A student must achieve a final quality-point average of at least 3.00 to receive the degree.

TIME TO COMPLETE PROFESSIONAL DEGREE REQUIREMENTS

A full-time student in the Professional degree program is allowed a maximum of three calendar years to complete all degree requirements, from the date of the first graduate-student status registration in prerequisite or graduate courses. A part-time student in this program is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to graduate status, nor does it encompass any specified period spent on approved leave of absence under the conditions and requirements then prevailing.

Students who do not complete degree requirements within the allowed time will have their graduate status terminated. They may be readmitted to graduate status under conditions specified by the Department chairman.

RESIDENCE AND CONTINUOUS STUDY

All work for the degree must be done in residence (on the campus) except when special permission is granted by the Chairman of the department. The student must maintain continuous registration in the School. Failure to do so breaks the student's registration and necessitates application for readmission to the Professional degree program under whatever conditions and regulations are in effect at that time.

DOCTORAL STUDY

Programs in Engineering Administration and in Systems Analysis leading to the degree of Doctor of Science provide advanced study and research to enable gifted students to extend their knowledge and to enhance their career opportunities in research or education.

Admission to Doctoral Study

All applicants must meet the general requirements for admission to d
study stated on pages 31–32.

Applicants for doctoral study in Engineering Administration must
Master's degree, with a superior record of academic achievement in En
ing Administration or a related field. Applicants for study in Systems A
must have a master's degree, with a superior record of academic achiev
in systems analysis or a related field.

As part of the admissions condition for doctoral study (1) in fields of
neering Administration, superior performance on the comprehensive exa
tion for the degree of Master of Engineering Administration, or (2) in Sy
Analysis, superior performance on the comprehensive examination for t
gree of Master of Science (Systems Analysis), is required before work f
doctoral program may be undertaken. Outstanding professional performa
also considered in evaluating all doctoral applicants.

Programs of Study

Major fields leading to the degree of Doctor of Science are available in
neering Administration and in Systems Analysis. In addition to the major
one or two minor areas of concentration are normally required, which
be chosen from the areas administered by this Department and/or from ap
priate areas available in other departments of the University. The genera
quirements for doctoral study are stated on pages 32–35.

ENGINEERING ADMINISTRATION UNDERGRADUATE COURSES

150 Introduction to Engineering Administration (3)

The interrelationships of engineering, science, and management; concep
foundations for interaction of human factors in individuals, groups
the social environment of engineering activities. Familiarization
typical activities of engineering managers and with factors bearing
motivation of engineers and on engineers as managers. Social and
ganizational factors relevant to the management of engineers. This co
is preliminary to the complete management process studied in EAd 2
(Fall, spring, summer)

160 Introduction to Engineering Economic Analysis (3)

Influence of the time element: interest rates, equivalence, present wo
annual cost, internal rate of return. Incremental analysis. Data for eco
sis. Characteristics of an accounting system: balance sheet, profit and
statement, depreciation, allocation of fixed costs, financial statement ana
sis. (Fall, spring, summer)

170 Basic Quantitative Methods for Engineering Administration (3)

An introductory treatment of quantitative tools and techniques impo
in engineering administration, with emphasis on their application.
cepts of probability and decision-making in administrative decisions.
(Fall, spring, summer)

ENGINEERING ADMINISTRATION GRADUATE COURSES

201 Management for Engineers and Scientists (3)

Basic principles of engineering administration; management functions of planning, organizing, directing, and controlling; emphasis on industrial, scientific, and engineering environments. Open to students in programs outside the Department of Engineering Administration and open to candidates for the Master of Science degree in the School of Engineering and Applied Science. May not be taken by candidates for the degree of Master of Engineering Administration or for the degree of Doctor of Science with a major field in Engineering Administration. Open to advanced undergraduate students with permission of instructor. Students who receive credit for EAd 201 cannot receive credit for EAd 211–12. (As arranged)

204 Administration of Engineering Contracts (3)

Study of the total contracting process, including initial budget preparation and justification, actions leading to the execution of a contract, and administration of the contract to completion; considered from the viewpoints of the industrial and government buyer and the seller of technical materials and services. (Fall and spring)

207 The Personnel Function for Engineering Administrators (3)

Principles of managing human talent, the most vital resource in engineering or research; emphasis on principles, theory, and practical considerations of the personnel function for engineering managers, with practical applications in an engineering administration environment. (Fall and spring)

210 Engineering Law (3)

Legal principles and procedures of interest to engineers, the American legal system, contracts and specifications, liability of professional engineers, antitrust problems, agency relationships, negotiable instruments, patent and proprietary rights, special problems in research and developmental contracts. (Fall and spring)

211–12 Engineering Administration (3–3)

Comprehensive and systematic study of the administrative process; industrial, scientific, and engineering environments. Planning: objectives, prediction, policies, plans and characteristics of plans. Organizing: theory of organization, structure, authority, specialization, delegation, staff and committees. Directing: leadership, managing human and material resources. Controlling: setting standards, evaluating performance, using system feedback data for correction and improvement. Students who receive credit for EAd 211–12 cannot receive credit for EAd 201. Prerequisite: EAd 150, 160, or equivalent. (Fall, spring, summer)

213 Case Analysis in Engineering Administration (3)

Written analysis and class discussion of cases involving application of the principles of engineering administration and use of the scientific method. (Fall, even years)

221–22 Environmental Management (3–3)

Integration of social, technical, economic, and political forces which shape environment; review of government programs to combat air, water, solid

waste, noise, and thermal pollution; conducting and analyzing a re
ecology system; legal aspects of environmental management; eco
and technological impacts of environmental policies; effects of che
on ecology. Systematic waste management; social, political, and
nomic reactions to environmental policies. (Academic year)

231 **Program Management** (3)

Management science, the systems approach and traditional manag
concepts as applied to government and industry activities under pro
managers. Computer simulation of the management of a project a
velop an earth satellite to the point of launch (GREMEX), with stu
participation. (Spring)

241 **Construction Management I** (3)

Contract negotiations; aspects of contracts and specifications importa
management. Construction estimating and cost allocation in heavy
building construction; budgeting and accounting concepts. (Fall)

242 **Construction Management II** (3)

Construction administration: organization, construction planning
scheduling. Industrial relations and human factors in construction m
agement, work measurement, programming and progressing, project m
agement and control. (Spring)

243 **Construction Management III** (3)

Managerial problems associated with advanced methods of constructi
and equipment; trend of mechanization; equipment policy and depre
tion. (Fall)

251 **Management of Computer Organizations** (3)

Planning, organizing, and control of computer operations. Manageme
a computer organization as an independent service bureau or as an inte
part of a larger organization. Supervision of professional and subpro
sional computer personnel. Prerequsiite: EAd 211–12. (Fall)

253 **Production Management** (3)

Planning, organizing, and control of production; forecasting techniq
material management; methods of loading and scheduling productive pr
esses; electronic methods in production control. Organization and ad
istration of the plant engineering function with emphasis on maintena
control programs. Prerequisite: EAd 269 or permission of instruc
(Spring)

254 **Automatic Data Processing Systems** (3)

Logic of computers, arithmetic and control units, systems analysis for d
processing applications, systems design, systems economics, relation
scientific decision processes. (Fall and spring)

255 **Administration of Research and Development** (3)

Study of contemporary practices of administrators of scientific and en
neering research and development; the relation of these studies to
cepted managerial concepts, and their effect on contemporary manage
hierarchies and organizational structures. (Fall and spring)

261 **Economic Analysis in Engineering Planning** (3)

Concepts and theories employed in economic analysis of engineering pr
ects, including an introduction to engineering economy, interest formu

equivalence, analysis of alternatives, reliability, maintainability, and life cycle cost. Theory and examples emphasize real world applications. Emphasis on economic feasibility as an essential prerequisite of successful engineering applications. Prerequisite: EAd 269 or permission of instructor. (Fall and spring)

265 **Transportation Management I** (3)

Integration of social, technical, economic, and political considerations which shape transportation systems and their management. Review of local, state, and federal government programs in transportation. Conducting a management study of a local, regional, or national system. (Fall)

266 **Transportation Management II** (3)

Legal aspects of transportation systems and their management. (Spring)

269 **Elements of Decision-making and Problem-solving** (3)

History and orientation of quantitative methods; concept of quantitative decision-making; decision criteria under certainty, risk, and uncertainty; game theory; utility; the time factor; replacement models. Prerequisite: EAd 170 or equivalent. (Fall, spring, summer)

281–82 **Systems Analysis and Management** (3–3)

Systems analysis as applied to management, especially the planning function. Properties, nature, structure, and organization of systems; conceptualization of the total system. Operational functioning and description of systems. Objectives, alternatives, models, criteria, and feedback as analytical considerations. Enterprises, input-output structure of the U.S. economy and organizations from the systems point of view. Case analyses. (Academic year)

283 **Systems Engineering I** (3)

Concept of system structure and organization. Linear and nonlinear systems analysis; dynamics and stability of systems. Introduction to optimization methods. (Fall)

284 **Systems Engineering II** (3)

Design of systems; simulation and modeling of systems; adaptive systems; system optimization. (Spring)

285 **Seminar: Administrative Problems** (3)

Individual analysis of complex administrative problems, with group evaluation and discussion. Prerequisite: 18 semester hours of graduate credit. (Fall and spring)

293 **Technical Enterprises** (3)

Essential features of technology-based companies; basic issues of planning, organizing, financing, and managing a new venture from the entrepreneur's point of view; case studies and a detailed plan for a venture. Designed for those within technical firms and those within government who depend on technical firms as suppliers. (Fall)

294 **Marketing of Technology I** (3)

Marketing of industrial goods and high-technology projects; emphasis on the federal government as the customer. Products, channels, organization, selling, technical service, and control; case analyses. (Spring)

295 Management of Technical Information (3)

Needs and objectives of technical information systems, functions in technical information, storage and retrieval, abstracting, usage in technical information systems, system organization.

297 Problems in Engineering Administration (3)

Project course providing the student with the opportunity to various concepts and tools previously studied to the solution of in engineering administration. Students work individually or groups, each on a problem proposed by the student and approve instructor. Departmental. Open to Master's degree students onl (Fall, spring, summer)

298 Research (arr.)

Basic or applied research in engineering administration or systems sis. May be repeated for credit. Departmental. Open to Master's students only. (Fall, spring, summer)

299–300 Thesis Research (3–3)

(Fall and spring)

311 Marketing of Technology II (3)

Continuation of EAd 294. Special attention to marketing research gotiation, and international marketing. Required for Master's candidates in the Marketing of Technology program. Prerequisite 294. (Fall, even years)

321 Management Information Systems (3)

Study and development of information systems used by middle higher management of technological and scientific organizations control of many facets of the organization at all managerial levels quired for Master's degree candidates in the Management Informa Systems program. (Fall, odd years)

386 Advanced Topics in Management (3)

Reading and discussion of classic and important recent literature con ing the philosophy and application of management principles. odd years)

387 Technological Forecasting (3)

Concepts and methodology: normative and exploratory forecasting source allocation and forecasting, technology transfer, technological and its effects on forecasting, technology assessment. (Spring years)

388 Cost Effectiveness (3)

Concepts of evaluation of engineered systems, current methods and in methodology, system resource requirements, probability and theory in cost effectiveness studies, systems approach to cost effectiveness studies. (Spring, odd years)

394 Advanced Study (arr.)

Limited to Departmental Professional degree students. May be repeated for credit. (As arranged)

395–96 Seminar: Professional Project (3–3)

Limited to Departmental Profesaional degree candidates. ranged)

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)




Operations
Research

Operations Research

Professors W.H. Marlow *(Chairman)*, D. Gross, N.D. Singpurwalla, A.T. acco, G.P. McCormick
Professorial Lecturers B. Cosby, Jr., W.W. Wolman, I. Shimi
Associate Professors J.E. Falk, D.P. Tihansky *(Research)*
Associate Professorial Lecturers J. Waller, N.D. Glassman, J.P. Ann Bennington, W.W. Hogan, Jr., J.L. Horowitz, D.A. Pierce
Assistant Professors J.D. Marsh, Jr., Z. Barzily *(Research)*
Assistant Professorial Lecturers A.L. Haines, J.H. Grotte

Programs in Operations Research lead to the degrees of Master of Scienc Doctor of Science.

MASTER'S STUDY

The objective of the program in Operations Research is to prepare stud with appropriate undergraduate backgrounds for study in depth of analyti oriented techniques of management decision-making and their applications

Expanded scientific, statistical, and mathematical knowledge, combined growing needs in technological as well as social areas, have created incr demands for individuals trained in operations research. The discipline of op ations research uses scientific principles supported by statistical and mat matical methodology to study the function and structure of complex techn industrial, military, and social systems in an effort to evaluate the probab effects of proposed courses of action, to establish criteria to judge the effec ness of these courses, and to assist in the making of optimal decis The program in Operations Research provides a scientific basis for solving p lems involving the interaction of many factors and organizational compone in the interests of the whole or total problem. This breadth of interest is example of the "systems approach" in the sense that a system is an inter nected complex of functionally related components. Most operations rese efforts begin with specific aspects of the general problem and proceed to sideration of the system as a whole. Just as the engineer may start with study of subsystems or components of a general problem, so may the oper tions research analyst.

Admission

In addition to the requirements for admission to graduate study (see pages 25), the applicant for the program in Operations Research leading to the de of Master of Science must have an adequate knowledge of probability and tistics. This requirement can be met by satisfactory completion of the se undergraduate courses or approved equivalents: ApSc 115, *Engineering Ana sis III;* and Stat 191, *Probabilistic and Statistical Methods for Operations search.*

Required Courses

Core courses required in the field of Operations Research are OR 201, 202, 210, and 299–300 (for those electing a thesis) or 291 (for those not electing

thesis). Students must complete OR 201, 202, 209, and 210 before attempting any other courses; however, in certain cases, permission may be granted for concurrent registration. Students electing OR 291 normally complete this course in the last semester of the program. The remainder of the program is selected, with the approval of the adviser, generally in an area of concentration from courses in the Department of Operations Research. Appropriate courses from other departments of the University may also be approved as electives.

Areas of Concentration

The philosophy of the Department of Operations Research is to provide programs flexible enough to accommodate those whose interests lie in applications and those whose interests lie in theory. Specific areas of concentration and suggested departmental electives follow:

GENERAL OPERATIONS RESEARCH

OR 251: Linear Programming
OR 252: Nonlinear Programming
OR 261: Theory of Games
OR 275: Introduction to Scheduling
OR 277: Queuing Theory
OR 279: Inventory Control

With the approval of the adviser, other courses may be elected from the Department.

MANAGEMENT SCIENCE

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 237: Logistics Planning
OR 251: Linear Programming
OR 261: Theory of Games
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 275: Introduction to Scheduling
OR 279: Inventory Control

With the approval of the adviser, courses may be elected from the departments of Business Administration, Economics, Engineering Administration, and Management Science.

MATHEMATICAL MODELING IN INFORMATION SYSTEMS

OR 251: Linear Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 275: Introduction to Scheduling
OR 277: Queuing Theory

With the approval of the adviser, courses may be elected from the departments of Electrical Engineering and Computer Science and Management Science.

MATHEMATICAL OPTIMIZATION

OR 251: Linear Programming
OR 252: Nonlinear Programming
OR 253: Integer, Network, and Dynamic Programming
OR 261: Theory of Games
OR 275: Introduction to Scheduling

With the approval of the adviser, courses may be elected from Applied Science and the Department of Mathematics.

MODEL BUILDING FOR TRANSPORTATION FLOWS

OR 231: Theory of Traffic Flow
OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 252: Nonlinear Programming
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
OR 281: Reliability Theory I

With the approval of the adviser, courses may be elected from the departments of Civil, Mechanical, and Environmental Engineering; Engineering Administration; Urban and Regional Planning; and from the National Law Center.

OPERATIONS RESEARCH IN INDUSTRIAL ENGINEERING SYSTEMS

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 237: Logistics Planning
OR 251: Linear Programming
OR 252: Nonlinear Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 275: Introduction to Scheduling
OR 277: Queuing Theory
OR 279: Inventory Control
OR 281: Reliability Theory I

QUANTITATIVE DECISION-MAKING FOR PUBLIC POLICY

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 235: Operations Research in Public Policy
OR 236: Operations Research in Social Systems
OR 251: Linear Programming
OR 261: Theory of Games
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation

With the approval of the adviser, courses may be elected from the departments of Civil, Mechanical, and Environmental Engineering; Economics; Public Administration; and Urban and Regional Planning.

STOCHASTIC MODELING

OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
OR 279: Inventory Control
OR 281: Reliability Theory I

With the approval of the adviser, courses may be elected from the Department of Statistics.

PROFESSIONAL DEGREE PROGRAM

Programs of advanced study and research lead to the degree of Applied Scientist. General requirements for admission are stated on pages 29–30. Departmental requirements consist of an applied operations research major, an applied out-of-department minor, and a demonstration of competence.

DOCTORAL STUDY

Programs in Operations Research leading to the degree of Doctor of Science provide advanced study and research to enable the student to extend his field of knowledge and to enhance his career opportunities in research, analysis, management, administration, or education.

Admission

In addition to the general requirements for admission to doctoral study (see pages 31–32), the applicant for the doctoral program in Operations Research must have a Master's degree, with a superior record of academic achievement. Outstanding professional performance is also considered in evaluating applicants.

Programs of Study

Doctoral programs are planned so that the student may obtain an adequate breadth in operations research and sufficient depth in areas of specialization to permit him to complete a dissertation that will be a significant contribution to the field. Possible areas of concentration include mathematical programming, inventory, queuing, reliability, and traffic theory. In addition to the major in Operations Research, two minor areas of concentration are normally required. One minor area must be in Applied Science, Mathematics, or Statistics. The second minor area may be chosen from areas of concentration within the Department or from appropriate areas available in other departments of the University, such as Business Administration; Civil, Mechanical, and Environmental Engineering; Economics; Electrical Engineering and Computer Science; Engineering Administration; Health Care Administration; Management Science; Mathematics; and Urban and Regional Planning. The general requirements for doctoral study are stated on pages 32–35.

OPERATIONS RESEARCH GRADUATE COURSES

201 Survey of Operations Research Methods I (3)
Basic concepts and techniques of operations research as applied to problems in industrial, governmental, and military decision-making. Allocation models including the simplex procedure of linear programming, transportation and assignment models, queuing theory, inventory theory, game theory, and decision-making under uncertainty. Prerequisite: ApSc 115 or equivalent. (Fall and spring)

202 Survey of Operations Research Methods II (3)
Simulation, Monte Carlo techniques; networks; integer programming; introduction to nonlinear programming; dynamic programming; reliability and replacement. Prerequisite: OR 201 or equivalent. (Fall and spring)

209 Mathematics in Operations Research I (3)
Fundamental methods and practical procedures for deterministic decision models in operations research involving a number of variables. Applications of linear models for resource allocations. Applications to data representation and algorithmic procedures for linear and nonlinear optimization models. Applications of linear algebra and real multivariate analysis. (Fall)

210 Mathematics in Operations Research II (3)
Fundamental methods and practical procedures for stochastic decision models in operations research involving applications of complex variables. Applications of linear differential, difference, and differential-difference systems to various areas in operations research. Applications of modern numerical methods. (Spring)

231 Theory of Traffic Flow (3)
Definitions and measurement of traffic stream parameters; dynamic theories: follow-the-leader models of traffic flow; kinematic theories and fluid analogies; traffic cybernetics; statistical distributions and queuing theory; stochastic approaches to static delay problems; simulation of traffic problems. Prerequisite: ApSc 115 or equivalent. (Spring, odd years)

232 Applications of Linear and Nonlinear Optimization Theory (3)
Introduction to penalty-function methods for solving linear and nonlinear optimization problems through use of existing computer codes. Formulation of optimization models in application areas of structural design, nutrition, pollution control, resource allocation, biology, economics, psychology, statistics, and chemical processes. Admission by permission of instructor. (Fall)

235 Operations Research in Public Policy (3)
Quantitative methods in health, education, and welfare. Health planning models, hospital operations analysis, analysis of educational systems, and welfare planning. Case studies include medical manpower planning, hospital admissions systems, comprehensive health care planning models, assessment of effects of innovation in education, determination of welfare priorities, and resource allocation in welfare problems. Prerequisite: knowledge of calculus and fundamentals of probability and statistics. May be repeated for credit. (Fall)

236 Operations Research in Social Systems (3)
Quantitative methods in urban development and the administration of jus

tice. Studies of police operations; models for court management; analysis of correctional problems; location of public facilities; scheduling and routing problems; manpower usage; passenger, freight, and vehicular traffic problems; housing problems; models of emergency operations. Prerequisite: knowledge of calculus and fundamentals of probability and statistics. May be repeated for credit. (Spring)

237 **Logistics Planning** (3)
Quantitative methods in model building for logistics systems including organization, procurement, transportation, inventory, maintenance, and their interrelationships. Applications stressed. Prerequisite: ApSc 115 or equivalent. (Spring, even years)

251 **Linear Programming** (3)
Basic computational, theoretical, and applied areas with emphasis on the general linear programming problems; simplex procedures; duality problems; parametric linear programming and sensitivity analysis, transportation problems. (Fall and spring)

252 **Nonlinear Programming** (3)
Basic topics in optimization theory, including convex sets and functions, first- and second-order optimality criteria, and algorithms. Methods for solving unconstrained problems; linearly and nonlinearly constrained problems, and certain problems with special structures. Applications discussed where appropriate. (Spring)

253 **Integer, Network, and Dynamic Programming** (3)
(Formerly Integer and Discrete Programming)
Methods and applications of optimization problems requiring integral solutions. Cutting plane methods, branch and bound methods, group theoretic methods. Dynamic programming. Network programming: shortest route problems, max flow problems. Prerequisite: OR 202 or 251; or permission of instructor. (Fall, even years)

261 **Theory of Games** (3)
Study of mathematical models with applications to the relationships among independent competitive entities (persons or organizations in environment of competition, bargaining, bidding), selection of optimum strategies, minimax concept, connections with linear programming and decision functions, two-person and n-person zero and nonzero sum games. (Fall)

271 **Forecasting Techniques** (3)
Regression analysis and its use as a forecasting tool; uses and limitations of time-series analysis in forecasting; business indicators and index numbers. Introduction to spectral theory; correlogram, periodogram, and special density. Prerequisite: ApSc 115 or equivalent. (Spring, even years)

273 **Digital Systems Simulation** (3)
Monte Carlo techniques, random number and random deviate generation. Simulation languages. Operating considerations, including model validation, steady-state, and statistical analyses of simulation output. Applications in inventory, queuing, and production scheduling. Prerequisite: ApSc 115 or equivalent and knowledge of FORTRAN or BASIC. (Spring, odd years)

275 **Introduction to Scheduling** (3)
Theory of scheduling with emphasis on industrial applications; assembly

line balancing; sequencing and scheduling of jobs in machine shops. Mathematical optimization, heuristic programming, and computer simulation approaches to these problems are examined. Prerequisite: OR 20 or permission of instructor. (Fall, even years)

277 Queuing Theory (3)

Characterization of queuing systems. Single-channel exponential models. Additional Markovian single- and multiple-channel models, including birth-death processes, finite sources, bulk queues, Erlangian models, and series queues. Models with general arrival and/or service patterns. Model-building and basic solution techniques are stressed in addition to formal theoretical developments. (Spring)

279 Inventory Control (3)

Application of mathematical techniques to decisions regarding when and how much to produce or purchase. Various mathematical models of inventory systems with deterministic and stochastic demands, continuous and periodic review policies, multi-item models with constraints. Demand uncertainty and forecasting in inventory models. Prerequisite: ApSc 115 or equivalent. (Fall)

281 Reliability Theory I (3)

Review of estimation procedures, regularity conditions for maximum likelihood estimators, limit theorems, order statistics, and extreme value theory; probabilistic derivation of failure models from hazard-rate and renewal-theoretic considerations; topics in censored, truncated, and accelerated life tests for exponential and extremal types of distributions emphasizing linear and minimum-risk invariant estimators; sequential analysis and sequential life testing in both classical and Bayesian frameworks; nonparametric characterization of failure distributions and mathematical properties of failure-rate functions. Prerequisite: Stat 191 or equivalent. (Fall)

291 Problems in Operations Research (3)

Field experience in operations research on a team basis. Each small group locates an actual problem and formulates solution by operations research models. Class evaluation of progress. (Spring)

297 Special Topics in Operations Research (3)

Selected topics in operations research, as arranged. Prerequisite: permission of instructor. May be repeated for credit. (Fall and spring)

298 Research (arr.)

Basic or applied research in operations research. May be repeated for credit. (Fall and spring)

299–300 Thesis Research (3–3)

(Fall and spring)

351 Advanced Topics in Mathematical Programming (3)

Special topics, including geometric programming, branch and bound methods, max-min problems, pseudo-Boolean programming, calculus of variations, optimal control, and large-scale programming. Prerequisite: OR 252 or permission of instructor. (Fall, odd years)

361 Games, Decisions, and Value Theory (3)

General structure of statistical games: concepts of utility and optimal

strategies, the invariance principle, sequential decision processes, Bayes procedures in games. Principles of value theory: measurement of relative values, metagames, and the dominance principle. Prerequisite: OR 261, Stat 191; or permission of instructor. (Spring, odd years)

371 **Advanced Topics in Forecasting** (3)

Model estimation using maximum likelihood and Bayes methods, seasonal models and their forecasting. Transfer function models, their identification, fitting, and checking. Univariate spectral analysis; the cross correlation function and the cross spectrum; estimation of cross spectra. Prerequisite: OR 271. (Fall, even years)

377 **Advanced Stochastic Models in Operations Research** (3)

Selected applied probability models, including Brownian motion, renewal theory, denumerable Markov chains, semi-Markov processes, and Markov decision problems. Applications to topics in advanced queuing and inventory theories, including busy periods, waiting times, imbedded Markov chains, and GI/G/1 queues; and conditions for optimality of (s, S) policies, stochastic leadtime problems, state-dependent leadtimes, and multi-echelon problems. Prerequisite: OR 277, 279; or permission of instructor. (Fall, even years)

381 **Reliability Theory II** (3)

Nonparametric methods in reliability: increasing failure rate (IFR) and decreasing failure rate (DFR) characterizations of failure distributions, tests for IFR, DFR, and "U-shaped" distributions. Coherent structures: classes of distributions preserved under coherent structures, bounds on system reliability using modular decomposition. Drenick's theorem, preservation of monotone failure rates. Replacement: comparison of random, age, and block replacement policies. Repairman problems. Redundancy optimization and allocation of redundancy. Prerequisite: Stat 191 and permission of instructor. (Spring, even years)

391 **Project for Professional Degree** (3)

Limited to students in the Professional degree program. (Fall and spring)

396 **Seminar: Operations Research** (arr.)

May be repeated for credit. (Fall and spring)

397 **Advanced Topics in Operations Research** (3)

Advanced topics from the literature of operations research for analysis, presentation, and discussion. Reading assignments from the professional journals selected by the instructor and the student. May be repeated for credit. (Fall and spring)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

Required Courses in Engineering Undergraduate Curricula Offered by Columbian College of Arts and Sciences and by th Graduate School for Arts and Sciences

For convenience, descriptions of required courses in undergraduate curricul which are offered by Columbian College of Arts and Sciences and the Graduat School of Arts and Sciences are listed here. See the *Undergraduate and Grad uate Catalogue* for elective courses in the humanities and social sciences.

BIOCHEMISTRY

221–22 General Biochemistry (3 or 4—4 or 5)

A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Generally, graduate students *must* register for Bioc 221, 4 semester hours; Bioc 222, 5 semester hours. However, graduate students taking Bioc 225–26, ForS 281–82, Micr 241–42, or Phys 223–24 may register for Bioc 221–22 without the laboratory. With specific recommendations by the underegraduate adviser and the Department, undergraduate students may register for Bioc 221, 3 semester hours; Bioc 222, 4 semester hours. Prerequisite: Chem 152, 154. Material fee (graduate students only), $20 a semester. (Academic year)

BIOLOGICAL SCIENCES

Biology

11–12 Introductory Biology for Science Majors (4–4)

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Prerequisite to BiSc 12: BiSc 11. Material fee, $18 a semester. (Academic year)

Zoology

145 Introduction to Vertebrate Embryology (4)

Lecture (2 hours), laboratory (4 hours). Origin and early development of the individual, formation of organ systems. Emphasis on frog, chick, and pig, with reference to human embryo. Material fee, $20. (Fall)

148 Histology (4)

Lecture (2 hours), laboratory (4 hours). Introduction to microscopical anatomy of normal tissues and organs with emphasis on the interrelationship of structure and function. Material fee, $20. (Fall and spring)

CHEMISTRY

13 General Chemistry (4)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Atomic structure, chemical bonding; chemical equations; acids and bases; chemi-

cal equilibrium; liquid and solid states; periodicity; electrochemistry; organic chemistry. Prerequisite: Math 31, Phys 2. Laboratory fee, $28. (Fall)

22 **Introductory Quantitative Analysis** (4)

Lecture (2 hours), laboratory (6 hours). Theory and practice of quantitative analysis by classical methods; introduction to instrumental analysis. Prerequisite: Chem 12. Laboratory fee, $28. (Fall and spring)

151–52 **Organic Chemistry** (3–3)

Chemistry of the compounds of carbon. Prerequisite to Chem 151: Chem 12 or 16. Prerequisite to Chem 152: Chem 151. (Academic year)

153–54 **Organic Chemistry Laboratory** (1–1)

Laboratory complement of Chem 151–52. Prerequisite or concurrent registration: Chem 151–52. Prerequisite to Chem 154: Chem 153. Laboratory fee, $28 a semester. (Academic year)

ENGLISH

*9 **English Composition: Language as Communication** (3)

Intensive course in English grammar and composition for students inadequately prepared for Engl 10. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 10. Engl 9 meets five hours a week and carries three semester hours of credit. Fees: tuition, $294; special fee, $25. (Fall and spring)

*10 **English Composition: Language as Communication** (3)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure. (Fall and spring)

GEOLOGY

136 **Engineering Geology** (3)

Geological principles and processes and their application to civil and mechanical engineering. Prerequisite: Math 31, Phys 2 or 4; or permission of instructor. (Spring)

MATHEMATICS

30 **Precalculus** (3)

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 *College Algebra* and Math 6 *Plane Trigonometry;* or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent.

* Students whose College Board English Composition Achievement Test scores suggest inadequate preparation may be assigned to Engl 9 or may be tested in vocabulary, spelling, grammar, standard usage and writing skill, before placement in either Engl 9 or 10. Students whose scores and/or writing skill indicate superior competence will be allowed to waive the Engl 10 requirement.

Prior to registration, new students must take a placement examination in algebra and trigonometry. (Fall and spring)

31 **Calculus of One Variable** (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30* or equivalent. (Fall and spring)

32 **Calculus of Several Variables** (3)

Vectors, determinants, partial derivatives, multiple integrals, infinite series. Prerequisite: Math 31. (Fall and spring)

PHYSICS

3 **Foundations of Physics** (3)

Development of conceptual principles underlying modern physical knowledge; basics of mechanics, heat and electromagnetism, including the classical concepts of energy, momentum, heat, temperature, entropy, electric and magnetic fields, optics. May not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 9-10. Prerequisite: two years of college preparatory mathematics or concurrent registration in Math 6. (Fall and spring)

14 **Introductory Mechanics and Thermal Physics** (3)

Physical principles of mechanics and thermal physics utilizing tools of calculus. Vector calculus, equilibrium phenomena, kinematics, Newton's Laws, conservation of mass, momentum and energy, rotational motion, small vibrations, thermometry, macroscopic and microscopic properties of ideal gases, laws of thermodynamics, thermal properties of solids and liquids. Prerequisite: Phys 3 or equivalent, Math 31. Laboratory fee, $18. (Spring)

15 **Elements of Electricity and Magnetism** (3)

Introductory aspects of electromagnetic theory. Static electric fields, Coulomb's Law, Gauss' Law, electric potential, capacitance and dielectrics, electric current and resistance. Ampere's Law, Faraday's Law, Maxwell's equations in integral form, electromagnetic waves. Prerequisite: Phys 3 or equivalent, Math 31. Laboratory fee, $18. (Fall)

16 **Introduction to Modern Physics** (3)

Elementary approach to basic principles of quantum theory. Wave-particle duality, the hydrogen atom, Pauli's exclusion principle. X-ray spectra, the atomic nucleus, radioactivity, nuclear reactions, statistical distribution laws, applications to molecular and solid state physics. Prerequisite Phys 14, 15, Math 32. Laboratory fee, $15. (Spring)

SOCIOLOGY

126 **Urban Sociology** (3)

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development. (Fall)

* Math 30 may be waived as a prerequisite by examination on scheduled dates.

GENERAL INFORMATION

Registration

THE DATES, HOURS, AND PLACE OF REGISTRATION will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

A student cannot register for classes until he has received a letter of admission to the University issued by the appropriate admitting office.

No registration is accepted for less than a semester or one summer session.

A student may not register concurrently in this University and another institution without the prior permission of the dean of the college, school, or division in which he is registered in this University. Registration in more than one college, school, or division of the University requires the written permission of the deans concerned, *prior to registration*. Allowance of credit for work done concurrently at another institution is at the discretion of the appropriate committee.

ELIGIBILITY FOR REGISTRATION

Registration for the following categories of campus students is held on the days of registration stated in the University Calendar. A student who is suspended or whose record is not clear for any reason is not eligible to register.

New Student.—Upon receipt of a letter of admission, the new student is eligible for registration on the stated days of registration.

Readmitted Student.—A student previously registered in the University who has not registered for campus courses during the preceding semester or summer session must apply for and receive a letter of readmission from the appropriate admitting office before he or she is eligible for registration.

Continuing Student.—The student registered for campus courses in the immediately preceding semester or the Summer Session preceding the fall semester is eligible to register assuming good standing and enrollment in a continuing program.

REGISTRATION CHANGES AND WITHDRAWALS.(see pages 179–180, 185–186)

Fees and Financial Regulations

FEES PAID BY STUDENTS cover only a portion of the cost of the operation of th University. Income from endowment funds, grants, and gifts from alumni an friends of the institution make up the difference.

The following fees and financial regulations were adopted for the 1976 Sum mer Sessions and the academic year 1976–77. (See page 178 for projected tuition and fee increases for 1977–80.)

Tuition Fees

For undergraduate study:	
Full-time program (12 or more hours a semester)	$1,350.00
Part-time program, for each semester hour	100.00
Summer Sessions, for each semester hour	100.00
For graduate study*	
For each semester hour for which the student registers	100.00

Doctoral students are required to register for minimum hour-loads,† as follows:

1. Full-time doctoral students must register for a minimum of 12 semester hours a semester until 24 hours of work have been completed beyond the qualifying examination; and a minimum of 4 semester hours a semester thereafter until the satisfactory completion of the final examination.
2. Part-time doctoral students must register for a minimum of 6 semester hours a semester until 24 hours of work have been completed beyond the qualifying examination; and for a minimum of 4 semester hours a semester thereafter until the satisfactory completion of the final examination.

University Center Fee

(Charged all students registered on campus,‡ nonrefundable)

For students registered for 11 or more semester hours on campus: Each semester	50.50
For students registered for less than 11 semester hours in a semester on campus: For each semester hour for which the student registers	4.75
For students maintaining "continuous registration" status: Each semester	4.75

* Registration in thesis courses (299–300) entitles the student, during such registration to the advice of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished an additional semester will be granted, requiring payment of a "continuous registration" fee (see page 177). If the preparation of the thesis extends beyond the three-semester period, approval for this extension will be required and the student must repeat the thesis course 300 and pay tuition as for a repeated course, provided the over-all time limit for earning the degree is not exceeded.

† No minimum hour-load is required during the summer sessions.

‡ Students in off-campus programs are charged the University Center Fee only when registered for courses on campus.

Additional Course Fees

In certain courses additional fees, such as laboratory and material fees, are charged. These fees are charged by the semester and, unless otherwise indicated, may be defrayed in two payments when the tuition is paid in this manner. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the laboratory fee the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Bachelor's, Master's, Doctor's degrees	$25.00
Fee for Binding Master's Thesis	10.00
Fee for Microfilm Service and Printing Announcement of Final Examination for the Doctoral Degree	60.00

Residence Hall Fees (see page 195).

Special Fees

Application fee (undergraduate degree candidates) nonrefundable	10.00
Application fee (graduate degree candidates), nonrefundable	25.00
Advanced tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student	$100.00
Housing deposit, nonrefundable, charged each applicant for residence hall space	100.00
Admission tests (when required)	6.00–12.00
Late-registration fee, for failure to register within the designated period	15.00
Late payment fee, charged for failure to make payments when due (see "Payment of Fees," pages 178–179)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 178–179)	35.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, returned by the bank for insufficient funds, or for any other reason	15.00
Continuous registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements*—due and payable on the official days of registration	100.00
Engineers' Council fee, charged each student in the School of Engineering and Applied Science for each semester or any part thereof except the summer term	5.00
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25.00
For each examination to qualify for advanced standing and for each special examination	5.00

* Payment of the continuous registration fee entitles the student who is granted leave of absence to return and continue his work toward a degree under the academic requirements which were in force at the time of his first registration. The continuous registration fee applies toward neither tuition fee nor residence requirements for the degree. (See footnotes on page 176.)

See page 188 for regulation governing Military Leave.

English test for foreign students (when required)	5.0
Laboratory checkout fee, for failure to check out of chemistry laboratory by the date deadline set by the instructor*	10.0
Transcript fee, for each transcript of record	2.0
If two or more transcripts are requested at the same time, fee for each of the first two copies is $2 each, fee for each additional copy	.5
Replacement of lost or stolen picture identification card	2.0

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student and Alumni Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES 1977–80

In order that students and their parents may plan more realistically for a total four-year period, tuition increases for the academic years 1977–78, 1978–79, and 1979–80 have been estimated as follows:

Increase by year (full-time undergraduate students):	
1977–78	$200.00
1978–79	200.00
1979–80	200.00
† Increase by semester hour (graduate and part-time undergraduate students):	
1977–78	$7.00
1978–79	5.00
1979–80	5.00

It is not possible to project future economic data with certainty. The increases outlined above are merely estimates based on present circumstances and should in no way be interpreted as fixed limits on tuition increases. The University hopes to keep tuition increases as low as possible, but it is obligated to maintain a sound financial basis. Economic conditions in the recent past, particularly as they affect private educational institutions, have been extremely variable and significant increases in tuition in excess of the above limits may be required.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made out to George Washington University.

The Student Accounts Office has responsibility for billing and maintaining

* A student who drops a chemistry course before the end of the semester must check out of the laboratory at the next regular laboratory period.

† Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

student accounts for tuition, various fees, and room and board charges. A student registered for six semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 27, 1976 (for the fall semester), and March 9, 1977 (for the spring semester). Interest at the rate of eight per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $625 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of eight per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his right to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

PREPAID AND DEFERRED PAYMENT PLANS FOR PARENTS

Several commercial programs for parents who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the Dean of the School. Notification

* Regulations concerning withdrawals and refunds for the Summer Sessions are stated in the *Summer Sessions Schedule of Classes*.

to an instructor is not an acceptable notice (see "Withdrawal," page 186).

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters.

1. *Complete withdrawal* from the University:

Fall Semester

Withdrawal dated on or before September 10, 1976	90 per cent
Withdrawal dated September 13 to September 24, 1976	75 per cent
Withdrawal dated September 27 to October 8, 1976	50 per cent
Withdrawal dated after October 8, 1976	none

Spring Semester

Withdrawal dated on or before January 21, 1977	90 per cent
Withdrawal dated January 24 to February 4, 1977	75 per cent
Withdrawal dated February 7 to February 18, 1977	50 per cent
Withdrawal dated after February 18, 1977	none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal* by a *part-time student*, the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in an undergraduate full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for complete withdrawal from the University (see No. 1, above). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 188).
5. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be refunded or reduced because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred, and will not be credited to another semester (exception: students granted military leave, see page 188).

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

Financial Aid*

FOR UNDERGRADUATE STUDY

GEORGE WASHINGTON UNIVERSITY offers a program of financial assistance of two basic types: awards for academic achievement without reference to financ

* For information concerning financial aid for students from foreign countries, see page 104.

cial circumstances—honor scholarships; and scholarships, grants, loans, and employment based upon demonstrated financial need.

Honor Scholarships.—George Washington University honor scholarships of up to $1,000 for the academic year based entirely upon academic achievement and potential without regard to financial need are restricted to incoming freshmen and are extremely limited in number.

Need-based Aid.—The University offers extensive programs of scholarships, grants, loans, and employment based upon demonstrated need. The University participates in the National Direct Student Loan, Basic Educational Opportunity Grant, Supplemental Educational Opportunity Grant, and the College Work-Study programs.

Applications and supporting credentials for financial aid must be filed by February 1 (entering freshmen), March 1 (enrolled undergraduate or entering transfer students) preceding the academic year of the award for the fall semester; by November 1 for the spring semester; and by April 1 for the summer sessions*. A student must reapply for financial aid each year.

Complete information concerning financial assistance is contained in the pamphlet "Student Financial Aid," which is available at the Office of Student Financial Aid, George Washington University, Washington, D.C. 20052.

Scholarships and Grants

Scholarships are awarded for the academic year unless otherwise specified and are credited in equal parts for each semester. Each holder must carry a full schedule of academic work during the period for which the scholarship is awarded.

The following scholarships are limited to students in the School of Engineering and Applied Science. The University offers many others which are open to engineering students.

Frederick Albert and Alma Hand Britten Scholarships (1959).—Bequest of Alma Hand Britten for scholarship assistance to students entering the School of Engineering and Applied Science who would not otherwise be able to pursue such professional study. Available for undergraduate and graduate study.

Henry Harding Carter Scholarship (1896).—Established by Maria M. Carter in memory of her husband to aid a deserving student who is preparing for the civil engineering profession. Available to students working toward the degree of Bachelor of Science (Civil Engineering).

Henry Parsons Erwin Scholarship (1955).—Established by Helen B. Erwin as a memorial to her husband, a former Trustee of the University. A partial scholarship for a student in Engineering and Applied Science.

Louis E. Giles Memorial Scholarships (1966).—Bequest of Susie E. Giles in honor and memory of her husband for scholarships to undergraduate and graduate students in the School of Engineering and Applied Science requiring financial assistance.

The George Hyman Construction Company Scholarships (1974).—Established by the George Hyman Construction Company to aid deserving students preparing for the civil engineering profession. These partial tuition undergrad-

* A Summer Sessions student is eligible for consideration only if he is enrolled in this University for at least 8 semester hours in the immediately preceding spring semester or has applied for financial aid for the following fall semester.

uate scholarships begin in the fall semester and extend for four years, provid the holder maintains a *B* average based upon a full course load leading t degree in civil engineering and continues to be in financial need.

George Washington University Board of Trustees Scholarships.—Full- a partial-tuition undergraduate scholarships which begin in the fall semester a extend for four successive academic years, provided the holder maintains a average, as well as a high standard of deportment, and continues to be in fina cial need. Candidates must plan to select a curriculum leading to a Bachelo degree.

William Washington Dyer, Jr. Memorial Scholarship (1976).—Established Eleanor Folsom Dyer as a memorial to her husband, a graduate of the Scho of Engineering and the National Law Center. A partial scholarship for a st dent in Engineering and Applied Science.

FOR GRADUATE STUDY

Scholarships, Fellowships, Assistantships

The George Washington University program of financial assistance for gradu students includes assistantships, fellowships, traineeships, graduate scholarship research appointments, part-time employment, and loans. Application for a mission to graduate study is a prerequisite for consideration.

Application and correspondence concerning assistantships, fellowships, traine ships, or graduate scholarships, should be sent directly to the Dean of the Schoo and addressed to George Washington University, Washington, D.C. 2005 Unless otherwise specified, application and supporting credentials should be sub mitted not later than February 1 preceding the period for which the award made.

Frederick Albert and Alma Hand Britten Scholarships (1959).—See abov

Paul H. and Margaret M. deMaine Scholarships (1967).—Full and parti scholarships for graduate students whose research involves the use of computer Inquiries should be made to the Director of the Center for Administrative an Academic Computing of the University.

Louis E. Giles Memorial Scholarships (1966).—See above.

Phi Delta Gamma Scholarship Endowment Fund (1968).—Established b the Beta Chapter of Phi Delta Gamma, national fraternity for graduate women For graduate women students.

National Science Foundation Graduate Fellowships.—Fellowships leading t graduate degrees in the mathematical, physical, medical, biological, engineering and social sciences, and in the history and philosophy of science; provides tuition, fees, and stipends. Open to students who have been admitted to gra uate status and who have completed less than one calendar year of graduate study. Applications should be made to the Fellowship Office, National Re search Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418

Research Assistantships in Operations Research and Related Fields.—Ava able to graduates, and to undergraduates on the junior and senior levels, in t school of the University. Research Assistants are expected to work 20 hours week conducting research in support of an established research program, programming or in conducting individual research on an approved researc project. Stipends range up to $8,000, depending on the status of the stude and the tenure of the appointment (9–12 months). Further information

applications are available from Director, Institute for Management Science and Engineering, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20052.

Research Scholar Assistantships, GWU—NASA-Langley Program.—See page 36.

Resident Assistantships (men and women).—Available to graduate students and seniors in any field who are interested in working with the student personnel program in University residence halls. Specific duties vary with the position, but basically consist of counseling, advising student groups, and administration. Remuneration includes full tuition and a furnished room for the academic year. All positions are part-time, and staff members must enroll as full-time students in degree-granting programs. Initial contact should be made in November; application should be completed before March 1. Further information may be obtained from the Office of the Director of Housing.

SPONSORED AWARDS FOR GRADUATE STUDY

Information regarding awards sponsored by foundations, professional and learned societies, industries, and others which may be used in support of graduate study is available at the Graduate Fellowship Information Center, 2025 H St., N.W., for students enrolled at George Washington University. Information is also available on distinguished programs such as the Rhodes, Marshall, National Science Foundation, Fulbright, Rotary International, and Danforth as well as many others.

As deadlines for application vary, qualified students should make inquiries well in advance of the year of planned graduate study.

LOAN FUNDS

Several loan funds are available to students in the University in accordance with the qualifications placed thereon by the donors. Two loan programs limited to students in the School of Engineering and Applied Science are available. Students should direct inquiries to and file applications with the Office of Student Financial Aid. Applications for the National Direct Student Loan should be filed no later than April 1 for the following academic year. Complete information is contained in the pamphlet "Student Financial Aid," which is available in the Office of Student Financial Aid, George Washington University, Washington, D.C. 20052.

Warren Stickler Memorial Loan Fund (1966).—A fund established by the Precision Measurements Association as a memorial to Warren Stickler is available to engineering students.

John Brewster Willis, Jr., Loan Fund in Mechanical Engineering.—Established by Mrs. William L. Lane as a memorial to her nephew, John Brewster Willis, Jr., available to Mechanical Engineering students (graduate or undergraduate) who are primarily interested in aeronautics.

A number of short-term emergency loan funds are also available at the University. Information concerning these funds is available from the Office of Student Financial Aid.

STUDENT EMPLOYMENT

The University participates in the College Work-Study Program. Inqui
should be addressed to the Office of Student Financial Aid and should be
ceived by April 1 for the following academic year. In addition, the Stud
and Alumni Career Services Office maintains a registry of both full-time
part-time positions available in the Washington Area for undergraduate
graduate students.

After registration, students may apply at the Student and Alumni Ca
Services Office, Woodhull House, 2033 G Street, N.W., for interviews
referrals to positions for which they are qualified.

FOREIGN STUDENTS

Undergraduate foreign students with proven financial need who have comple
one semester of full-time work (15 hours) at this University with a *B* aver
are eligible to apply for the Board of Trustees Scholarships. Scholarships
awarded in the spring for the following academic year. See instructions
applying for undergraduate financial aid, page 180.

Limited awards for graduate teaching fellowships are the responsibility
the chairman of the department or dean of the school in which the degree
to be earned. Work as a teaching fellow requires excellent knowledge of E
lish—both spoken and written.

Long-term loan funds for undergraduate and graduate foreign students
limited in amount and are available only to those foreign-born persons w
have established resident status in the United States through the Immigrati
and Naturalization Service.

Students who wish to study in the United States should have available
ficient funds to cover expenses for one full year before attempting to enter
college or university. The cost at this University for one academic year (Se
tember–May) is approximately $5,500. This estimate includes room and boa
tuition, books, clothes, and incidental expenses; no travel, holiday, or medi
expenses are included.

Prizes

Norman B. Ames Memorial Award.—Established by many friends of Pr
fessor Ames and awarded annually to a graduating senior of the School of E
gineering and Applied Science who is nominated by his fellow students as ha
ing made significant contributions to the students in the School of Enginee
and Applied Science and to the School and University.

Martin Mahler Prize in Materials Testing.—A one-year membership in
American Society for Testing Materials awarded to the upper division or gr
uate student in engineering who submits the best reports on tests in the ma
rials laboratories course with preference given to prestressed concrete tests.

School of Engineering and Applied Science Distinguished Scholar.—
honor accorded annually by the Faculty of the School of Engineering and A

plied Science to the senior who graduates with the highest scholastic standing. The student's name is engraved on a plaque displayed in Tompkins Hall of Engineering.

Deacon Ames Activities Award.—A plaque awarded annually by Gamma Beta Chapter to the senior in the School of Engineering and Applied Science with the most outstanding record in activities for the entire period of his attendance.

Regulations

A STUDENT ENROLLED in the School of Engineering and Applied Science is required to conform to the following regulations.

A student who withdraws or is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue work only under the rules and regulations in force at the time of return.

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, registration may be canceled. If such falsification is discovered after the student has established an academic record at the University, he or she may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Faculty) for subsequent registration in the University.

ACADEMIC DISHONESTY

The University community, in order to fulfill its purposes, must establish and maintain guidelines of academic behavior. All members of the community are expected to exhibit honesty and competence in their academic work. Incoming students have a special responsibility to acquaint themselves with, and make use of, all proper procedures for doing research, writing papers, and taking examinations.

Members of the community will be presumed to be familiar with the proper academic procedures and held responsible for applying them. Deliberate failure to act in accordance with such procedures will be considered academic dishonesty. Acts of academic dishonesty are a legal, moral, and intellectual offense against the community and will be prosecuted through the proper University channels.

Copies of the University policy on academic dishonesty can be obtained from the following offices: all department chairmen, all academic deans, and the Vice President for Academic Affairs.

CHANGES IN PROGRAM OF STUDY

A student may not make any changes in his approved program of studies without the approval of the Dean. Requests for change in class registration must be made on a form provided in the School Office.

During the seven days following the first day of classes of a semester, cou may be added to the student's program with the approval of the instructor, faculty adviser, and the Dean.

Courses may be dropped by undergraduate students without academic p alty only during the fourteen days following the first day of classes, with approval of the instructor, the student's adviser, and the Dean. Courses be dropped by graduate students without academic penalty only within the four weeks of a semester, with the approval of the instructor, the faculty viser, and the Dean.

WITHDRAWAL

A student who withdraws or is otherwise absent from the University for semester or more must apply for readmission. If readmitted, he continues work under the requirements and regulations in force at the time of readm sion.

Applications for withdrawal from the University or for change in class sch ule must be made in person or in writing to the Dean of the School. Notifi tion to an instructor is not an acceptable notice.

Withdrawal from a course or from the University, *without academic or fin cial penalty*, requires the permission of the Dean of the School. Permission withdraw from the University will not be granted to a student who does have a clear financial record.

Withdrawal from any course without academic penalty after the fourteen day following the first day of classes of a semester may be granted by the De to undergraduate students only under the following conditions: (1) exceptio circumstances make the request necessary; (2) the request is submitted on official form for late withdrawal; (3) as of the date of request, the grades all courses involved are *C* or better. In exceptional circumstances the De may authorize withdrawal for graduate students without academic penalty af the first four weeks of a semester. In all cases financial regulations governi withdrawal remain in full effect.

All charges for courses dropped without the approval of the Dean must met by the student. Reporting the dropping of a course to an instructor d not effect its discontinuance.

CREDIT

Credit is given only after registration for and satisfactory completion of the quired work of a course or upon the granting of advanced standing. A stu who takes a course as an auditor may not take the same course later for c

On request the Registrar will issue to undergraduate degree candidates a ance sheet showing the amount of work completed and the requirements maining to be met for the degree.

Transcripts of Record

Official transcripts of student records are issued by the Registrar on writte

quest of the student or former student who has a clear financial record. A fee of two dollars is charged for each transcript.

Post-admission Transfer Credit

A student who plans to attend summer school at another institution and apply credit so earned toward graduation from this University must first secure the written approval of the Dean. In no event will credit in excess of what might be earned in a similar period in this University be recognized.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* degree requirements are satisfied. Students who have completed course registration (including the thesis) maintain continuous registration by paying the "continuous registration" fee (see page 177). By failing to register for one semester or more, the student breaks registration and must be readmitted. The procedure for readmission to the graduate programs is the same as that for undergraduates (see page 16). A "Readmitted Student" is subject to the regulations and requirements in force at the time of readmission.

Students must be registered during the summer if they are taking courses, are taking required examinations, are receiving guidance on theses or dissertations, or are expecting to graduate at the end of the Summer Sessions.

GRADUATION REQUIREMENTS

To be recommended by the faculty for graduation a student must have met the admission requirements of the School; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which he is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session immediately preceding the awarding of the degree.

Application for Graduation.—An "Application for Graduation" form must be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the senior or final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) dated September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

Attendance and Conduct.—The University reserves the right to refuse to confer a degree upon a candidate whose attendance or conduct has been unsatisfactory.

THE LIBRARY

All students registered in the University have the privilege of using the University Library. Its stacks are open, and all students are welcome to browse at

their leisure. A card denoting approved enrollment for the current seme must be presented when books are borrowed for outside use.

The loan period for stack books is 14 days. A fine of 25 cents is cha for each day a book is overdue. Any book which circulates is subject to re by the Library if needed for reserve or other use. Reserve books must be u in the reserve reading room when the Library is open, except that they may withdrawn for overnight use beginning at 8:30 p.m. A fine of 50 cent charged for each hour or fraction thereof that a reserve book is overd Grades of a student are withheld until the library record is clear.

All students using the University Library are expected to be familiar with detailed regulations, available at any of the Library's service desks.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period active duty, upon presentation to the Dean of a copy of military orders a a petition for such leave. The maintenance of "continuous registration" is required of the student on military leave; however, the student must apply readmission to the University well in advance of the semster of expected retu Payments for tuition and fees which are not refunded to the student at the ti military leave is granted will be maintained as a deferred credit for the studen account and use upon return to the University.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

The Family Educational Rights and Privacy Act of 1974 applies to insti tional policies governing access to and release of student education recor maintained by educational institutions which are recipients of federal fun The University complies with this statute, which states, in part, that such ins tutions must:

1. Afford students access to education records directly related to them;
2. Offer students an opportunity for a hearing to challenge such records inaccurate, misleading, or otherwise inappropriate; and
3. Receive the student's written consent before releasing information fro his or her education records to persons outside the University, except t directory information as indicated below. Personally identifiable informa tion may be furnished to a student's parents without such written consen only upon certification of the student's financial dependency.
4. Comply with judicial order or lawfully issued subpoena to release a st dent's record notifying this student of the action.

The University will release the following directory information upon request address; telephone number; dates of attendance; school, college, or division enrollment; field of study; credit hours earned; degrees earned; and honors re ceived. A student who does not wish such directory information released m file written notice to this effect in the Office of the Registrar.

University guidelines on the release of student information may be obtain from the Office of the Registrar.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "Lost and Found" Office is located on campus in the Safety and Security Office.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 220–222) contains regulations recently approved by the University's Board of Trustees.

Consortium of Universities of the Washington Metropolitan Area, Inc.

THE UNIVERSITIES IN WASHINGTON, D.C.—American University, Catholic University of America, *George Washington University*, Georgetown University, and Howard University—are associated in a Consortium through which they coordinate the use of their respective facilities; District of Columbia Teachers College, Gallaudet College, Mount Vernon College, and Trinity College are associate members of the Consortium. Students in approved programs leading to degrees in any one of these institutions have the opportunity to select from the combined offerings of all the particular courses which best meet their needs.

Participation is limited to campus degree candidates. The following, however, are excluded: students in Canon Law, Dentistry, Medicine, and Theology. Law students are also excluded from participation, except for candidates for the degree of Master of Laws at George Washington University and Georgetown University.

In special courses involving private instruction (as in music or art) or tutorial

study, if a special fee is charged, this fee is not covered by the Cons agreement and must be paid by the individual student to the institution ac tering the course. A student interested in registering for Reserve Officer ing Corps (ROTC) courses should consult the Registrar at the institut which the student is enrolled.

Students interested in taking courses at an institution other than thei should consult the program announcements of the other institutions. sortium application forms and instructions are available in the Office Registrar after the student has obtained registration materials. In order t ticipate in the Consortium program (1) the graduate student must obta approval of his adviser and should ascertain from the department of the i tion where the course is taught whether or not he or she is eligible for the and whether there is a space in the class, *or* (2) the undergraduate student obtain the approval of the adviser and *must* ascertain from the departme the institution where the course is taught whether or not he is eligible fo course and whether there is space in the class. Specific inquiries shou addressed to the Registrar. *Students may not take courses at another insti that are available at their own.* The student registers and pays at his own tution for all Consortium courses.

Center for Administrative and Academic Computing

THE CENTER FOR ADMINISTRATIVE AND ACADEMIC COMPUTING is located on third floor of Lisner Hall, 2023 G St., N.W. The computer and other ope tional supportive services are located on the first floor of Stuart Hall, 201 St., N.W. These facilities normally are available 24 hours a day, seven day week to all qualified faculty, staff, and students.

The Center provides computational facilities and services to academic, search, and administrative users. The Center staff conducts seminars, consu with users and provides operational assistance as required. The central proce ing unit is an IBM 370/145 with card reading capability, on-line disc storag eight high-speed and density tape units, two printers and remote entry dev for quick turnaround. The operating system is a modified OS/VS with most the commonly used compilers and a large library of programs.

Computer programming courses are offered by the School of Governme and Business Administration, the Department of Statistics, and the School Engineering and Applied Science. In addition, many other departments offe courses that utilize the computer as a research adjunct to course work.

The Speech and Hearing Clinic

THE SPEECH AND HEARING CLINIC offers diagnostic and remedial work for chi dren and adults with such communication difficulties as stuttering, lisping, cle palate speech, and cerebral-palsied speech; and with voice, articulatory, an hearing problems. Diagnostic and remedial work is also available for persons

ith nonstandard language usage due to such conditions as hearing loss, brain amage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $35. Fees for additional special-ed testing are dependent on the testing involved. The fees for individual peech or hearing therapy range from $4 to $25 a session. Fees are reduced or full-time students enrolled in the University and for persons receiving group herapy. Fees are payable at the Office of the Cashier.

The Reading Center

HE READING CENTER offers individual diagnostic and corrective services for all vels: primary, elementary, secondary, and adult. In addition, special reading mprovement classes are conducted for high school and college students as well s other adults.

A complete diagnosis includes psychological tests; vision, hearing, domi-ance, and spelling tests; and various types of reading achievement and apti-de tests. Results are interpreted, and a written report is presented in con-rence with the parents or the individual.

The special reading improvement classes for high school students, college udents, and other adults are offered throughout the year at stated intervals. mphasis is placed on improvement of vocabulary, speed, comprehension, and udy skills. Instruction in spelling is also provided as needed. Mechanical aids uch as the tachistoscope, rate accelerator, and controlled reader are available r increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $125; for individual instruction, 12 a lesson; for semi-individual instruction, $9 a lesson; for instruction in small roups, secondary level, $175 for 15 two-hour lessons. Reading classes (15 two-our sessions) are offered for adults, $175; for full-time George Washington niversity students and alumni, $65. Full-time employees may contact the Cen-r regarding special fees. All fees are payable in advance at the Reading enter.

Reading instruction is provided for first-year undergraduate students on the asis of need.

Veterans Education

HE VETERANS COUNSELOR IN the Office of the Registrar, Luther Rice Hall, -21 Eye St., N.W., assists students entitled to educational benefits as veterans, idows, or children of deceased or totally disabled veterans with any problems hich may arise concerning their benefits. This Office also processes certifica-on of enrollment and attendance to the Veterans Administration so that onthly allowances will be paid.

When feasible, students entitled to benefits as veterans or dependents of vet-rans should consult with the veterans counselor prior to submitting application o the Veterans Administration. All such students should obtain the instruction

sheet issued by the Office of the Registrar, which sets forth requirements to b fulfilled before certification of enrollment can be made to the Veterans Admin istration, and which includes other information of general interest.

The Veterans Administration is at 941 N. Capitol St., N.E., Washington D.C. 20421.

Alumni Associations

THE GENERAL ALUMNI ASSOCIATION

THE OBJECTIVES OF THIS ASSOCIATION are to unite the graduates who wish t associate themselves for charitable, educational, literary, and scientific purposes and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the Un versity and who have left the University in good standing, or any person who s or has been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those who are life members of The George Washington University Genera Alumni Association or the Alumni Association of any school of the Universit or are current contributors to the George Washington University Fund.

All alumni are urged to keep the Alumni Office informed of changes of ad dress or occupation and to supply information with regard to their fellow alumni. The Office is located in Alumni House, 714 21st St., N.W., George Washington University, Washington, D.C. 20052.

THE ENGINEER ALUMNI ASSOCIATION OF THE GEORGE WASHINGTON UNIVERSITY, INC.

The Engineer Alumni Association was organized in 1936 and incorporated in 1963 to coordinate with the General Alumni Association those activities of pri mary interest to the engineering alumnus. The objectives of the Association are to provide the link between the graduates and faculty of the School, to help promote the general welfare of the School of Engineering and Applied Science and of the University, to foster activities of the engineering organizations recog nized by the University, and to advance the engineering profession in general.

In 1966 a board of directors, comprised of 15 elected members of the Association and the Engineers' representatives serving on the Governing Board of the General Alumni Association, was established. The membership of the board of directors was expanded in 1969 to include the Director of Alumni Re lations and one representative each from the faculty of the School and the stu dent body. Members of the Association are elected each year, prior to the Jun meeting, to three-year board memberships as listed below:

Term Expiring 1976	*Term Expiring 1977*	*Term Expiring 1978*
Matthew Flato	Pastor Farinas	Taft H. Broome
Norris C. Hekimian	Robert J. Kiltie	Issa Khozeimeh
James A. Sinsabaugh	Albert K. Lee	Eric S. Mendelsohn
Marjorie Townsend	John A. LeReche	John A. Sporidas
John L. Wolfgang, Jr.	Javad Nilforoush	Dudley J. Schwartz

General Alumni Association Representatives
Douglas L. Jones
John R. Manning
Edward A. Wareham 3rd

Director of Alumni Relations
Elwood A. Smith

Faculty Representative
Galip M. Arkilic

Student Representative
George Russell

Regional Director
William H. Holt

Past President
Matthew Flato

At the June meeting each year the board elects officers for its operation during the upcoming year. The officers for the year 1976–77 are

President.—Issa Khozeimeh, B.S. (E.E.) 1967, M.S. 1973; 4537 Albermarle St., N.W., Washington, D.C. 20016

Vice President.—John L. Wolfgang, B.S.E.E. 1962, M.S.E. 1967; 5600 54th Ave., Riverdale, Md. 20840

Secretary.—Richard J. Pronk, B.S. in Engr. 1958; 12702 Bermuda Lane, Bowie, Md. 20715

Treasurer.—Pastor Farinas, M.E.A. 1972; 5 Bethayres Ct., Rockville, Md. 20855



STUDENT LIFE

THE OFFICE OF THE VICE PRESIDENT FOR STUDENT AFFAIRS develops studen life services, policies, and procedures to complement the University's form instruction program. These activities are implemented through the offices o the Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Edu tional Opportunity Program, Housing, International Students, Student Activit Student and Alumni Career Services, and Student Health Service.

Student Services

OFFICE OF THE DEAN OF STUDENTS

The Office of the Dean of Students provides counseling and information to t general student body, and assists in program development on campus, partic larly in the residence halls. The members of the staff of the Dean of Stude Office are informed on University policies and student services provided campus, enabling them to provide referrals and answers to many questi concerning general student life. Personal letters of recommendation for dents applying to graduate and professional schools can also be obtained f the Dean of Students Office. The Dean of Students works with the Advise International Students, the Director of the Counseling Center, the Director the Educational Opportunity Program, and the Director of Housing in t implementation of their programs.

Housing

Complete information concerning the University's residence halls is avail from the Director of Housing, George Washington University, Washing D.C. 20052. Information concerning off-campus housing near the Uni may be obtained at this Office.

Admission to the University does not include a room reservation. The dent will receive, with his notification of acceptance, University residence information, an application for residence hall space, and a declaration of to attend the University. The application for residence hall space must accompanied by a $100 *nonrefundable deposit*. The housing deposit is ap

toward the first semester's room charge. Rooms are leased for the academic year, and lease payment must be made by June 25 for the fall semester.

1976–77 Residence Hall Rates Per Person For Two Semesters*

For men:
Calhoun Hall
double room $1,075
triple room 1,025

For Women:
Strong Hall
single room $1,125
double room 1,075
triple room 1,000

For Men and Women:
Crawford Hall (limited to sophomores, juniors, and seniors)—
double room 1,050
Mitchell Hall (limited to sophomores, juniors, and seniors)—single room 1,150
Madison Hall
double room 1,075
triple room 1,000
Thurston Hall
double room, triple room, large room for four 1,075
suite for six 1,000

Food Service

Resident freshmen and sophomores are required to participate in the food service plan. Freshmen must participate in the seven-day, 20 meals per week plan, at the rate of $800* for the academic year. Sophomores may elect either the 20-meal plan or a five-day meal plan, 15 meals Monday through Friday, for $750* for the academic year. Either plan is optional for junior, senior, and graduate students. Food service payment does not cover University intersession or vacation periods. All meal cards admit bearer to the dining room in Thurston Hall and the second floor contract dining room in the Cloyd Heck Marvin Center.

Munson Hall Apartments

Munson Hall is a University-owned and operated apartment house containing 15 one-bedroom and 54 efficiency apartments. Graduate and married students are eligible to reside in Munson Hall. Those wishing to apply for an apartment should contact the Housing Office for a waiting list application. All leases are for 12 months.

Educational Opportunity Program

The Educational Opportunity Program is designed to offer a college education primarily to black and other minority students who are graduates of District of

* Residence Hall and food service prices subject to change.

Columbia high schools and/or other qualified District residents. It provides opportunity for a student to seek a degree in almost any field and at the sa time receive academic and/or financial assistance.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, pr viding services, conveniences, and recreational and social opportunities for st dents, faculty, staff, alumni, and guests. Its wide range of facilities provid the setting for a variety of programs conducted by the University Progra Board; the departments of Drama, Dance, and Music; and other student an faculty organizations.

The Center Governing Board, representative of all elements of the Univer sity community, plays an important role in the day-to-day functioning of th Center. This Board works closely with the full-time staff in the developmen of procedures and policies which provide a framework for the Center's opera tion.

STUDENT HEALTH SERVICE

The Student Health Service is an outpatient clinic designed to assist student registered on campus with their health needs. This Service is located at 93 22nd St., N.W. (in the H.B. Burns Memorial Building).

Physicians and physician assistants are available by appointment from 9 a.m. to 4:45 p.m., Monday through Friday. In addition, physician assistants ar available for primary care and triage to walk-in patients Monday through Fr day from 5 to 6:45 p.m. and on Saturday from 9 a.m. to 12 noon.

For serious emergencies occurring during hours when the Student Healt Service is closed, students may go to the Emergency Room of the Universit Hospital for treatment. This arrangement is for emergency care only, and a fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receiv treatment at the Student Health Service. A student who is not currently en rolled or who has severed his connection with the University is ineligible for medical benefits of the Student Health Service. Any student who so desire may engage physicians and nurses of his or her own choice, but the studen will be responsible for all the fees charged. The bills incurred from all service rendered outside of the Student Health Service (for example, X-ray work laboratories, and referrals to specialists or other outside physicians) are th responsibility of the student.

Health and Accident Insurance

The Student Health Service Office has arranged for and endorsed group healt and accident insurance, on an elective basis, for those *full-time* students who d not have other coverage. Interested students should consult the Student Heal Service Office.

COUNSELING CENTER

The Counseling Center works to enable the campus community to maximally profit from instruction by helping students overcome obstacles, anxieties, and confusions which hamper learning. Services are offered in three areas: (1) resolution of the individual's educational, vocational, personal, or social problems through short-term individual or group counseling/psychotherapy, vocational testing, or study skills remediation; (2) training graduate students, resident assistants, and paraprofessionals, as well as consulting on mental health topics; and (3) developing innovative methods to aid student growth, such as audiotaped information on undergraduate majors, counseling and therapy through written communication, and videotaped counselor skills training.

The Center also administers the Miller Analogies Test, admissions testing, and special assessments for business and industry. Through its Office of Community Services, the Center also provides vocational counseling and educational programs to the community in general.

Fees.—Students may request a cost-free interview between 9 a.m. and 4:30 p.m., Monday through Friday (except Friday mornings). If the student decides to continue the services offered, a fee of $5 per appointment will be charged for short-term treatment. If a test battery is called for, a flat fee of $12 will be added. However, if financial need is a factor, fee adjustments can be made.

The Counseling Center is located at 718 Twenty-first St., N.W.

INTERNATIONAL STUDENTS

International House, located at 2129 G St., N.W., is the campus center for students from foreign countries. It serves also as the headquarters of the International Students' Society, which seeks to promote international friendship and understanding by welcoming to its membership students from all countries, including those from the United States.

The International Student Adviser's Office is located in the International House. It is open each day throughout the school week for consultation on immigration regulations and on any matters concerning the social and academic welfare of students from abroad.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

The Student and Alumni Career Services Office provides assistance to GWU students and alumni seeking full-time, part-time, temporary, or permanent employment. All students are urged to become acquainted with the services of this Office early in their college experience.

Counseling concerning trends in employment, areas of employment, various test and examination announcements, preparation for job interviews, resume-writing, and other procedures for successful job application are always available. Specific career openings; an on-campus recruitment program by business, industry, government, and school systems; volunteer opportunities; and part-time and temporary jobs for students while attending school are all part of this service. Teacher credential files initiated by persons seeking employment in

all educational fields are maintained in this Office. Reference files for studen applying to law schools, medical schools, or other graduate schools are mai tained.

An understanding and knowledgeable approach to avenues of service f those people who do not find career satisfaction in structured systems of bus ness, government, and education is also provided in the Student and Alum Career Services Office.

RELIGIOUS LIFE

The University recognizes the contribution that religion makes to the life of it students and encourages them to participate in the various religious organiza tions of their own choice. Catholic, Jewish, and Protestant bodies sponso various groups and form a link between the University and the religious com munity. The advisers of the religious organizations are available for counsel ing.

Religious services in various traditions are provided regularly for the Univer sity community as announced.

DAVIS-HODGKINS HOUSE

The Davis-Hodgkins House is the student center of the School of Engineering and Applied Science, providing lounges, reading rooms, and student organiza tion offices. The House provides convenient, comfortable facilities for the ex change of ideas and good fellowship.

Student Activities

The offices of the Vice President for Student Affairs, the Dean of Students, the Director of the Cloyd Heck Marvin Center, and the Director of Student Activities are responsible for all co-curricular phases of student life.

STUDENT ACTIVITIES OFFICE

The Student Activities Office assists individual students and organizations i program development, campus leadership training, and participation in specia projects—both within the University community and in the community at large. This Office also serves as a central clearinghouse for development an maintenance of a master activities calendar—for registering and assisting camp us organizations, for scheduling facilities (except in the Marvin Center) an events, and for informing the University community of the many activities an programs which can enrich the educational experience through a variety o weekly, monthly, and annual publications. The Student Activities Office is also responsible for coordinating a comprehensive orientation program for new students entering the University. Students interested in participating in the many social, cultural, or extracurricular phases of University life should a

quaint themselves with the facilities and functions of the Student Activities Office and its staff.

UNIVERSITY COMMITTEES AND ORGANIZATIONS

The George Washington University is an active, working community where student involvement has become a motivating force in the governance of the University through the committee structure. This involvement has helped develop policies and programs beneficial not only to the student population, but to the total University community. While serving on these committees, student members are able to participate in the formulation and the application of ongoing institutional policy.

There are numerous committees on which members of the student body are able to serve. The Student Activities Office has a relatively complete file on major committees, and interested students should inquire there for further information. Additional information is also contained in the *Student Handbook*. A brief description of some of these committees follows:

Joint Committee of Faculty and Students.—This administrative committee, created in response to a resolution of the Faculty Senate, is composed of seven faculty members, seven student members, and other ex officio members. Members of this Committee are appointed by the President.

The Committee is officially charged to "facilitate all efforts to improve student-faculty relations," to "encourage student recommendations in all areas of Senate policy-formulation which affect student life," and to "recommend changes in the 'Rules and Regulations Governing the Conduct of Student Life.'" The Committee has specific advisory powers in many areas concerning student-faculty relations and the interests of the student body.

Committee on the Judicial System.—The Committee on the Judicial System is composed of three faculty members and three student members, one of whom is the Chairman of the Student Court, one a student member of the Student-Faculty Committee on Appeals, and one selected from the campus at large. The Committee on the Judicial System works closely with the Executive Secretary to the Judicial System to make sure that the various hearing bodies are efficiently, fairly, and expeditiously conducting their business.

Other committees include the following: the Committee on University Parking, the Committee on Religious Life, the Committee on Sponsored Research, the Committee on Student Publications, and the Committee on the University Bookstore.

The Student Nominating Board

This all-student board was created by the President upon the recommendation of the Joint Committee of Faculty and Students in February, 1971. The Board was established "to make appointments to all University Committees that have student members where there is no other existing means by or through organizational charter or constitution to do so."

The members of the Student Nominating Board are the President of Mortar Board; the President of Omicron Delta Kappa; a student member of the Graduate School of Arts and Sciences Advisory Council; and one representative from each of the following: Residence Hall Association, Engineers' Council,

Joint Committee of Faculty and Students, Student Bar Association, and Association of Medical Students.

The Program Board

The University Program Board, through its student committee structure and membership, provides a variety of cultural, social, and recreational programs on campus. As a result, students are afforded opportunities to broaden their educational experiences by developing and participating in those programs which contribute to the life of the University community.

Student membership on the Program Board is composed of four executive officers (Chairperson, Vice Chairperson, Secretary, Treasurer) elected from the general student body in the spring semester, and five committee chairpeople appointed after that election. The eight committees of the Program Board are the Advisory Council, Art Gallery Committee, Concert Committee, Film-Video Committee, Performing Arts Committee, Public Affairs Committee, Public Relations Committee, and Special Programming Committee. These students work with appointed faculty members and professional staff from the Division of Student Affairs in carrying out their many programs and activities.

THE ENGINEERS' COUNCIL

The Engineers' Council is the student governing body for the School of Engineering and Applied Science, composed of elected representatives from each level class and from the graduate student body, from each student organization in the School, and the House Manager of the Davis-Hodgkins House. The purpose of the Council is to provide liaison between the student body of the School and the Faculty, Administration, and Student Government of the University in all matters affecting the general interests and welfare of the student body, the School, or the University. The Council is maintained financially by the Engineers' Council fee paid by each student in the School, and sponsors the Engineers' Mixers and the Engineers' Ball. Council meetings are open to all students in the School.

STUDENT ORGANIZATIONS

The following is a representative list of organizations active at the University during 1975–76 of particular interest to students in the School of Engineering and Applied Science. More complete information on these and other organizations is available at the Student Activities Office.

Honor Societies

Sigma Xi.—A national scientific honor society, the purpose of which is to encourage original investigation in science, pure and applied. Outstanding graduate students in the sciences are eligible for full membership, and undergraduates who have shown marked ability in research may be elected to associate membership.

Delta Sigma Rho-Tau Kappa Alpha.—A national forensic society.

Mortar Board.—A national society for juniors and seniors, stressing leadership, scholarship, and service.

Omicron Delta Kappa.—A national society emphasizing leadership in extracurricular activities.

Phi Eta Sigma.—A national society established to encourage and reward high scholarship and attainment, membership in which is limited to those freshmen who attain a scholastic average of at least 3.50 or the equivalent.

Sigma Tau.—A national engineering honorary fraternity, the purpose of which is to recognize scholarship and professional attainment.

Tau Beta Pi.—A national engineering honorary fraternity, the purpose of which is to recognize distinguished scholarship and exemplary character.

International and Cultural Exchange Organizations

East Asian Society, Friends of Canada, International Students' Society, Latin American Association, Libyan Student Organization, Organization of Arab Students, Polish American Youth Club, Students' Cultural Association of India, World Affairs Society.

Performing Arts

GWU Dance Production Groups; Student Productions; University Chamber Choir, Chorus, Orchestra; University Program Board; University Theatre. A variety of programs is presented by these groups throughout the academic year.

Political Interest Organizations

GW Ripon Society, GW College Young Republicans, GW Young Democrats, Young Americans for Freedom, Young Socialist Alliance.

Professional Organizations

American Society of Civil Engineers (Student Chapter).

American Society of Mechanical Engineers (Student Chapter).

Institute of Electrical and Electronic Engineers (Student Chapter).

Theta Tau (Gamma Beta Chapter).—A national professional (engineering) fraternity. Membership by invitation to oustanding sudents who have completed successfully at least the first year in the School of Engineering and Applied Science.

Publications and Communications

The Cherry Tree (yearbook), *G.W. Forum* (student-faculty journal), *Potomac Review* (publication of Consortium graduate students), *The Rock Creek* (literary magazine), *Student Handbook*, *This Month* (listing of major cultural events in the Washington area), *Campus Calendar* (biweekly listing of scheduled events), *The University Hatchet* (semi-weekly newspaper), WRGW (University radio station), 676-NEWS (recorded telephone message of daily University activities).

Religious and Meditative Organizations

Baptist Student Union, B'nai B'rith Hillel Foundation, Christian Science Or-

ganization, Eastern Orthodox Fellowship, Eckankar Campus Society, Inter-Varsity Christian Fellowship, Lutheran Student Association, Newman Foundation, Psychegenics Club, Religious Society of Friends, Student International Meditation Society, Unitarian-Universalist Club, United Christian Fellowship, Wesley Foundation.

Service Organizations

Circle K, Ecology Action, GW Medical Aid, Project Share, St. Elizabeths Hospital Project, SERVE, Student Housing Project, Student Volunteer Action Council.

Social Fraternities

Delta Tau Delta, Kappa Sigma, Sigma Alpha Epsilon, Sigma Chi, Sigma Nu, Sigma Phi Epsilon, Tau Kappa Epsilon. The Interfraternity Forum coordinates the interest and concerns of some of the fraternities on campus.

Social Sororities

Delta Gamma, Delta Sigma Theta, Kappa Kappa Gamma, Phi Sigma Sigma. A Panhellenic Council includes representatives of sorority chapters at the University.

Special Interest and Advocate Groups

Black Peoples' Union, Jewish Activist Front, Legal Aid Bureau, Peoples' Union, D.C. Public Interest Research Group (GW Chapter), Student Recruitment Committee.

Sports, Hobbies, Recreational Organizations

Amateur Radio Club, Cheerleaders, Collegiate Bowling Club, Folkdance Club, Hockey Club, Military Collectors, Philubious Eggworte (music).

ATHLETICS AND INTRAMURAL SPORTS

The University is a member of the National Collegiate Athletic Association, the Eastern College Athletic Conference, the Association for Intercollegiate Athletics for Women and the Eastern Association of Intercollegiate Athletics for Women. Its teams participate against major universities throughout the Midwest and Eastern Seaboard. The intercollegiate programs for men and women offer such sports as basketball, baseball, soccer, tennis, golf, wrestling, crew, cross country, swimming and diving, squash, badminton and volleyball.

The University offers a broad program of intramural sports activities for both men and women through the Department of Human Kinetics and Leisure Studies.

MAJOR PROGRAM EVENTS

Art Exhibits.—The work of locally, nationally, and internationally known artists is shown in monthly exhibits in the Dimock Gallery in Lisner Lounge.

and in the art gallery of the Cloyd Heck Marvin Center. With the cooperation of the Curator of Art, an annual student art exhibit is presented.

Concert Series.—The Department of Music presents a series of concerts featuring faculty, guest, and student artists throughout each year.

Dance.—The GWU Dance Company presents major concerts, informal studio performances, experimental events, television appearances and lecture-demonstrations. Students may audition to become company members and have the opportunity to choreograph, perform and gain experience in the technical aspects of dance productions.

International Programs.—The International Students' Society presents an annual International Dinner in cooperation with foreign embassies and international restaurants. Other programs include regular forums and speakers on international topics.

Orchestra and Chorus Concert Series.—The University Orchestra and Chorus are two facets of the lively arts available to students either as credit courses or as extracurricular activities. The Chorus presents major performances to the University community three or four times a year, including regular winter and spring concerts. The University Orchestra presents several performances annually.

Program Board Series.—The University Program Board sponsors concerts and lectures each semester at which nationally known personalities appear.

Recreation Program.—The new Charles E. Smith Center for Physical Education and Athletics offers many facilities for student use. The University Recreation Association and the Department of Human Kinetics and Leisure Studies arrange a wide variety of sports and recreational activities and special events for all students.

Theatre.—The University Theatre produces four or five major plays and musicals during the year on the new proscenium/thrust stage in the Dorothy Betts Marvin Theatre or in Lisner Auditorium. Additional works, including original and experimental plays, are produced in a more intimate studio theatre. Students have the opportunity to participate in all aspects of theatre and may receive credit toward their B.A. or M.F.A. degrees for some of their production work.

THE UNIVERSITY

History and Organization

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington whose name it bears is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "that persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets and extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period,

the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for 50 years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine and Health Sciences, Engineering and Applied Science, Education, Government and Business Administration, and Public and International Affairs; the College of General Studies; the Division of University Students; the Division of Experimental Programs; and the Summer Sessions.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

The University Libraries

The Library collections of the University are housed in the University Library, the general library of the University, and in the libraries of the Institute for Sino-Soviet Studies, the National Law Center, and the School of Medicine and Health Sciences.

These collections contain approximately 675,000 volumes, to which are added some 35,000 volumes a year. Endowments, supplementing the University appropriation, provide books in the fields of American civilization, American literature, foreign service, history, public finance, and the social sciences; and gifts from many sources have enriched the collections. The Libraries currently receive 7,500 periodicals.

Information concerning the use of the Libraries may be obtained at the Library service desks.

The Library is administered for the curricular, reference, and recreational needs and interests of the students. Instruction in the use of the library is given upon request by the reference librarians. The Libraries endeavor to assist students and all members of the University to use the rich library resources of Washington and the unusual opportunities they offer for extensive research. Interlibrary loan arrangements are maintained with other libraries in the city and throughout the United States.

The student has access to the Library of Congress, the Public Library of the District of Columbia and its branches, and many of the other great special collections of the government departments. Graduate students at George Washington University may, upon application, be issued a Consortium library card which permits direct borrowing from the libraries of the other Consortium institutions.

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APPENDIX: RECENTLY ESTABLISH
REGULATI

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be sub
to change in connection with the establishment of judicial processes. Bulle
and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved
the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning proc
and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection
free speech and freedom of assembly, and to safeguarding the right of law
protest on campus; and is committed equally to maintaining the peace a
safety of the campus, in the knowledge that all rights are in jeopardy wh
violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington U
versity: that in the event a demonstration at this University exceeds the boun
of free assembly and lawful advocacy, and demonstrators are engaging in u
lawful acts which cause or imminently threaten injury to persons or proper
or which obstruct or interfere with normal and necessary University activit
this body affirms the authority of the President, or other University offici
designated to act in his absence, to take such reasonable steps, if possible afte
consultation with the Chairman of the Executive Committee of the Universi
Senate* and the President of the Student Body, as are required to restore
preserve order; including, if deemed necessary and appropriate, suspension
students or faculty engaging in such acts, and use of such law enforcement pe
sonnel as are needed to effect the removal, arrest, and prosecution of law
lators. Any such suspension shall be reviewed by an appropriate tribunal
soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on Octob
19, 1968:

Any student suspended from The George Washington University on
grounds of exceeding the bounds of free assembly and lawful advocacy
have his suspension reviewed by the Hearing Committee on Student Affairs

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performe
the Student-Faculty Committee on Appeals.

The George Washington University as soon after order is restored as is practicably possible.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

*Amended January 18, 1973.

(a) who engages in conduct that unreasonably obstructs teaching, research and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by such lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

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SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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COLLEGES AND SCHOOLS—DEGREE PROGRAMS

COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), As
ciate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A
Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bache
of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart. Sc
and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master
Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A
Master of Forensic Sciences (M.F.S.), Master of Music (Mus.M.), Master
Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master
Science in Forensic Science (M.S.F.S.), Master of Science in Special Studi
(M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.
Bachelor of Science (B.S.), and Doctor of Medicine (M.D.)

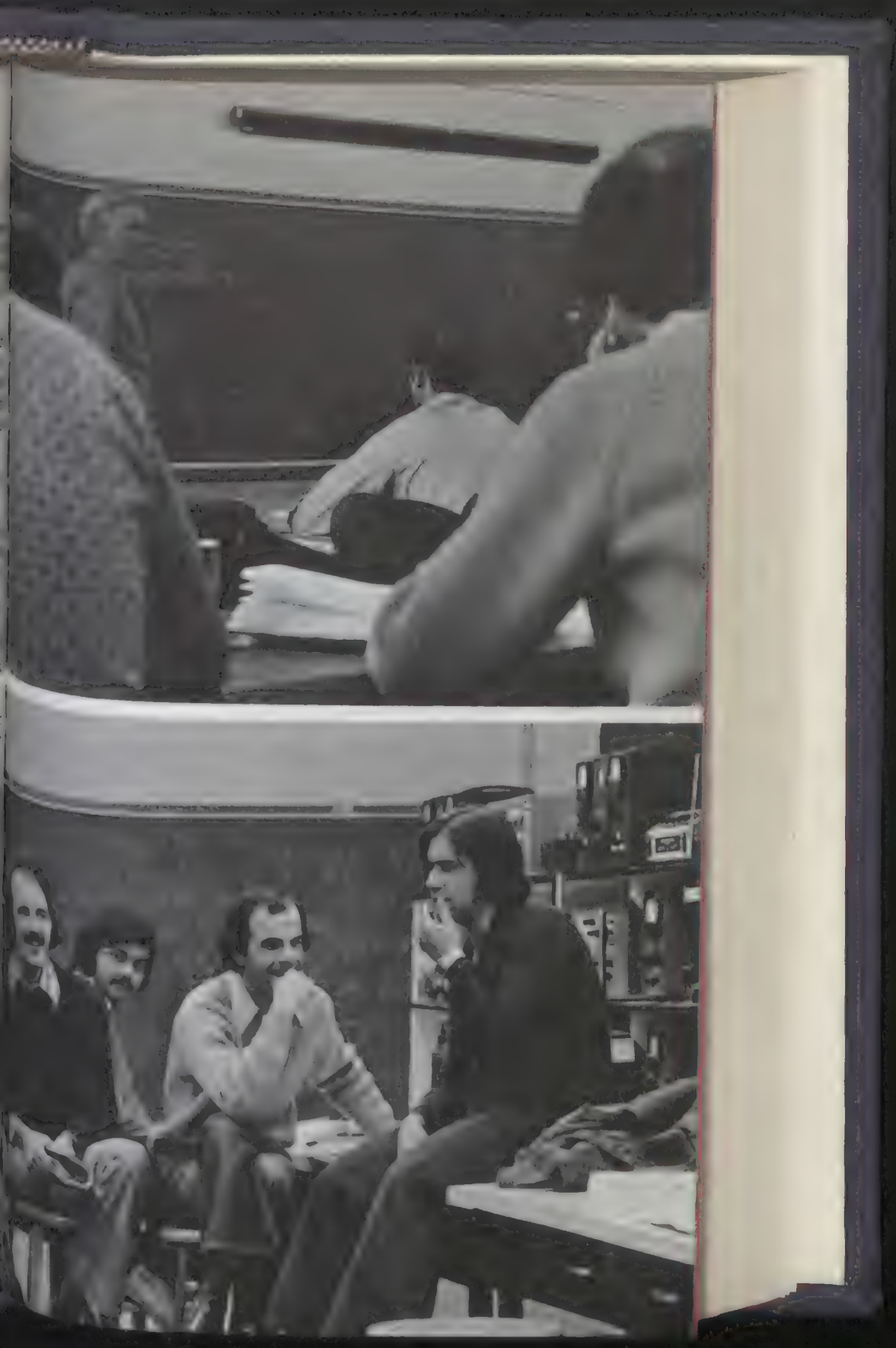
NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Mast
of Comparative Law (M.Comp.L.), Master of Comparative Law (Americ
Practice) (M.Comp.L. (Am.Prac.)), and Doctor of Juridical Science (S.J.D

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil E
gineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.
(E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Mast
of Engineering Administration (M.E.A.), Master of Science (M.S.), Doctor
Science (D.Sc.), Engineer (Engr.), and Applied Scientist (App.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachel
of Science in Human Kinetics and Leisure Studies (B.S. in H.K.L.S), Mast
of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.
Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Busine
Administration (B.B.A.), Bachelor of Science in Administration (B.S.
Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.
Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Ca
Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.
Master of Public Administration (M.P.A.), Master of Science in Administration
(M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Re
Plan.), Post-Master's Graduate Certificate in Health Care Administration (Gra
Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor
Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Ma
ter of Arts (M.A.), and Master of Science in International Affairs (M.S.I.A.



FACTS ABOUT GEORGE WASHINGTON UNIVERSIT

General Information	Private, nonsectarian, coeducational, founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of On-campus Students	16,229 (9,768 men, 6,461 women)
Number of On-campus Undergraduates	5,215 (2,875 men, 2,340 women)
Geographical Origin of Students	50 states, District of Columbia, 150 countries
1976–77 Tuition	Undergraduate: $2,700 for two semes Graduate: $100 for each semester ho
Number of Full-time Faculty	961 (81% with Doctoral degrees)
Number of Part-time Faculty	380 (includes some of the most distinguished men and women in Washington who serve as professorial lecturers)
Residence Hall Space	1,932
Room and Board	Cost varies from $1,750 to $1,950 for the academic year

Undergraduate majors: Accounting, American Civilization, American Litera Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology, Bo Business Administration, Cartography, Chemistry, Chinese Language and Litera Civil Engineering, Classical Archaeology and Anthropology, Classical Archaeolog Classics, Classical Humanities, Computer Science, Dramatic Art, East Asian St (China and Japan), Economics, Electrical Engineering, Elementary Educa English Literature, Environmental Studies, Fine Arts, French Language and Li ture, Geodesy, Geography, Geology, Germanic Languages and Literatures, Hi Human Kinetics and Leisure Studies, International Affairs, Journalism, Judaic St Latin American Studies, Law Enforcement, Mathematical Statistics, Mathem Mechanical Engineering, Medical Technology, Music (Applied, History and T ture, Theory), Nurse Anesthetist Program, Nurse Practitioner Program, ography, Philosophy, Physician's Assistant Program, Physics, Political Sc Premedicine, Psychology, Public Affairs, Radiologic Sciences and Admini Religion, Russian Language and Literature, Russian Literature and Civil Translation, Secondary Education, Sociology, Spanish American Literature, Sp Language and Literature, Speech Communication and Broadcasting, Speech P ogy and Audiology, Urban Affairs, Zoology.

Study leading to graduate or professional degrees is offered in the Graduate Sc of Arts and Sciences, the National Law Center, the School of Medicine and H Sciences, the School of Engineering and Applied Science, the School of Educ the School of Government and Business Administration, and the School of P and International Affairs.



GEORGE WASHINGTON UNIVERSITY CAMPUS / WASHINGTON, D.C.

THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

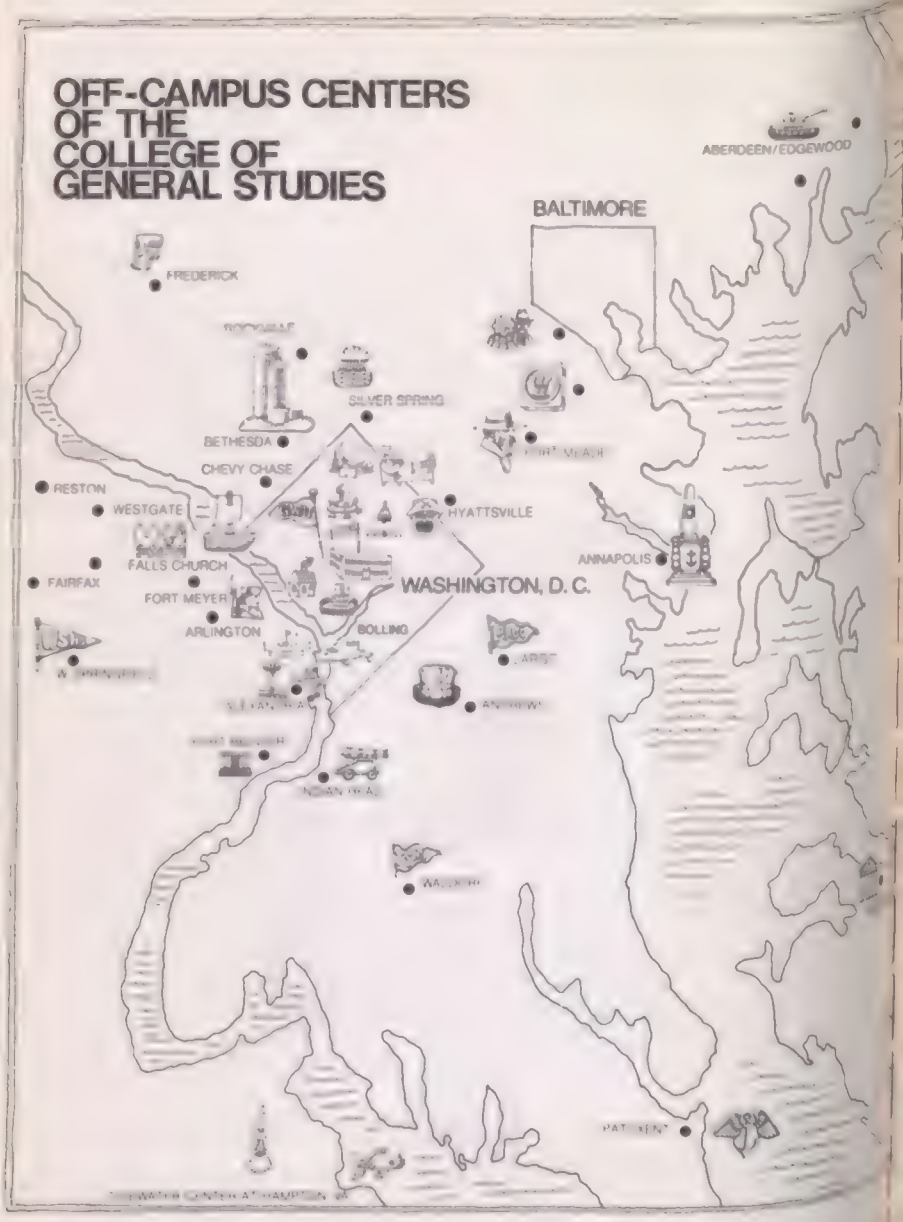
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Vol. LXXV, No. 7, July, 1976



COLLEGE OF GENERAL STUDIES

1976–1977



OFF-CAMPUS LOCATIONS OF THE COLLEGE OF GENERAL STUDIES

THE GEORGE WASHINGTON UNIVERSITY BULLETIN
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THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE COLLEGE OF GENERAL STUDIES 1976–77

WASHINGTON, D.C. 20052

From the Dean's Desk

The time has come when off-campus adult educational programs are widel accepted as an important element in university offerings, equivalent in the own way to the traditional resident educational experience.

The College of General Studies has been involved since its inception i 1950 in the organization and administration of an increasing variety of off campus programs. Today we offer a range of credit programs from the asso ciate to the doctoral level, with course content, faculty qualifications, and degree requirements basically the same as the on-campus programs of the university.

Building and maintaining the quality of programs that command academic and professional respect is an important and continuing concern for the Col lege. We feel we have a major asset in our close organizational relationship with the academic departments of the various undergraduate, graduate, and professional divisions on campus. Decisions concerning academic content for all credit programs rest with the appropriate campus division, and faculty for off-campus programs are selected and approved by the academic departments according to university-wide standards for expertise and experience.

We also recognize that we are dealing with a new, more involved, and often more demanding clientele—the adult, part-time student population which has emerged as the new majority in higher education, and which reflects the grow ing nationwide interest in recurrent education. Our program planners main tain close contact with the general community to determine how university resources can be applied most effectively. And we feel our status as a private university has been an important element in providing the flexibility to establish new types of programs to meet emerging needs.

We look forward to increasing the spectrum of our educational programs through the activities of our new Office of Conferences and Seminars. We are moving ahead to develop a growing selection of noncredit programs to serve our clientele, and we hope to rapidly increase our capability in this area.

Robert L. Holland
Dean
College of General Studies

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THE CALENDAR 1976–77*

AUGUST 1976

S	M	T	W	T	F	S
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31						

1976 FALL SEMESTER

August 25–September 13 — Off-campus registration† (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes*)
Application for February graduation due as part of registration

‡*September 2–4* — Registration on campus† *Thursday–Saturday*
Application for February graduation due as part of registration

September 6 — Labor Day (holiday) *Monday*

September 7 — On-campus classes begin *Tuesday*

September 11 — Off-campus Faculty Meeting *Saturday*

September 16 — Off-campus classes begin *Thursday*

October 11 — Columbus Day—no off-campus classes *Monday*

October 25 — Veteran's Day—no off-campus classes *Monday*

November 18 — D.Sc. Dissertations of February candidates due *Thursday*

November 19–20 — M.S. in Administration Comprehensive Examinations *Friday–Saturday*

November 24 — Thanksgiving recess begins after last class *Wednesday*

* Off-campus courses organized at any time.

† Application for Master's Comprehensive Examinations is the student's responsibility and must be made when registering for last courses required for degree.

‡ Hours of registration will be announced in the on-campus *Schedule of Classes*

November 29	Classes resume *Monday*
December 1	School of Engineering and Applied Science Master's Theses of February candidates due in Dean's office *Wednesday*
December 7	Last day of campus classes *Tuesday*
December 11	M.A. in Education Comprehensive Examinations *Saturday*
December 13–22	Campus Examination period *Monday–Wednesday*
December 20	Last day of off-campus classes *Monday*
January 3	Master's Theses (other than those in the School of Engineering and Applied Science) of February candidates due *Monday*

1977 SPRING SEMESTER

January 3–14	Off-campus registration* (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes*) Applications for May graduation due as part of registration
†*January 13–15*	Registration on campus* *Thursday–Saturday* Applications for May graduation due as part of registration
January 17	On-campus and off-campus classes begin *Monday*
January 20	Inauguration Day (holiday) *Thursday*
February 21	Winter Convocation (holiday) *Monday*
March 12	Spring Recess begins after last class *Saturday*
March 21	Classes resume *Monday*
March 21	Application for April M.A. in Education Comprehensive Examinations due *Monday*
March 23	D.Sc. Dissertation of May candidates due *Wednesday*
April 8	School of Engineering and Applied Science Master's Theses of May candidates due in Dean's Office *Friday*
April 15–16	M.S. in Administration Comprehensive Examinations *Friday–Saturday*
April 18	M.S. in Administration Theses of May candidates due in Dean's Office *Monday*
April 22	Last day of campus classes *Friday*
April 23	M.A. in Education Comprehensive Examinations *Saturday*
April 28	Last day of off-campus classes *Thursday*
April 28–May 7	Campus examination period *Thursday–Saturday*
April 29–May 6	Off-campus examination period *Friday–Friday*
May 8	Commencement *Sunday*

1977 SUMMER SESSIONS

There are two six and one-half week sessions and one thirteen-week session. Days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes*.

*plication for Master's Comprehensive Examinations is the student's responsibility and must be
de when registering for last courses required for degree
riod of registration will be announced in the on-campus *Schedule of Classes*.

THE UNIVERSITY

HISTORY

GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area is not without its reminders of historic interest to the University. President Monroe, who signed the charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

THE COLLEGES, SCHOOLS, AND DIVISIONS

George Washington University includes twelve colleges, schools, and divisions, as follows:

*Columbian College of Arts and Sciences** offers four-year programs in the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. The College also provides prelegal and premedical programs, and the preprofessional work required for admission to the School of Education and to the School of Public and International Affairs. Columbian College has academic jurisdiction over the off-campus programs leading to the degrees of Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Geodetic and Cartographic Science, and Bachelor of Science in Oceanography. These off-campus programs are administered by the College of General Studies.

The *Graduate School of Arts and Sciences*†‡ offers advanced study and research leading to the degrees of Master of Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Forensic Sciences, Master of Music, Master of Science, Master of Science in Forensic Science, Master of Science in Special Studies, Master of Science for Teachers, and Doctor of Philosophy. The degrees of Master of Arts in Special Studies and Master of Science in Special Studies are also available through off-campus programs administered by the College of General Studies.

The School of Medicine and Health Sciences†* offers work leading to the degrees of Associate in Science, Bachelor of Science, and Doctor of Medicine.

The National Law Center‡ offers courses leading to the degrees of Juris Doctor, Master of Laws, Master of Comparative Law, Master of Comparative Law (American Practice), and Doctor of Juridical Science; and special programs in Continuing Legal Education.

The School of Engineering and Applied Science offers courses leading to the degree of Bachelor of Science in the following areas: Civil Engineering, Electrical Engineering, and Mechanical Engineering. Graduate programs lead to the degrees of Master of Science, Master of Engineering Administration, Doc-

*Columbian College of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Bachelor of Arts and Doctor of Medicine.

†The Graduate School of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Master of Science and Doctor of Medicine and a dual program leading to the degrees of Doctor of Medicine and Doctor of Philosophy.

‡The National Law Center cooperates with the School of Public and International Affairs, the Graduate School of Arts and Sciences and the School of Government and Business Administration in offering a program leading to the combined degrees of Juris Doctor and Master of Arts.

tor of Science, Engineer, and Applied Scientist. The School has academic jur diction over the off-campus programs leading to the degrees of Master of S ence, Master of Engineering Administration, and Doctor of Science. The off-campus programs are administered by the College of General Studies.

The School of Education offers undergraduate programs leading to the d grees of Bachelor of Arts in Education and Bachelor of Science in Human K netics and Leisure Studies; graduate studies leading to the degrees of Master Arts in Education, Master of Arts in Teaching, Education Specialist, and Do tor of Education. The degree of Master of Arts in Education is also availabl through off-campus programs administered by the College of General Studies

*The School of Government and Business Administration** offers undergradu ate programs leading to the degrees of Bachelor of Business Administration an Bachelor of Science in Health Care Administration; graduate programs leadin to the degrees of Master of Arts in Government, Master of Arts in Health Ca Administration, Master of Business Administration, Master of Public Admin istration, Master of Urban and Regional Planning; the Post-Master's Graduat Certificate in Health Care Administration; the degrees of Doctor of Business Administration and Doctor of Public Administration. The School also has academic jurisdiction over off-campus programs leading to the degrees of Bachelor of Science in Administration and Master of Science in Administra tion. These off-campus programs are administered by the College of Genera Studies.

*The School of Public and International Affairs** offers undergraduate pro grams leading to the degree of Bachelor of Arts and graduate programs leadin to the degree of Master of Arts. The School also offers an off-campus pro gram leading to the degree of Master of Science in International Affairs.

The College of General Studies supplements the adult education program o the University through campus and off-campus study; conferences, seminars and special projects; and continuing education and noncredit programs. This College also administers the off-campus programs over which Columbian Col lege of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Engineering and Applied Science, the School of Education, and the School of Government and Business Administration have academic jurisdiction

The Division of University Students makes available courses for students no candidates for degrees in this University.

The Division of Experimental Programs.

The Summer Sessions.

ACADEMIC STATUS

George Washington University is accredited by its regional accrediting agency the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of Uni versity Women and is a member of the College Entrance Examination Board.

The National Law Center is a charter member of the Association of Amer can Law Schools and is approved by the Section of Legal Education and Ad missions to the Bar of the American Bar Association.

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* The National Law Center cooperates with the School of Public and International Affairs, the Graduate School of Arts and Sciences and the School of Government and Business Administration in offering a program leading to the combined degrees of Juris Doctor and Master of Arts

The School of Medicine and Health Sciences is a member of the Association of American Medical Colleges and is one of the medical colleges which has been continuously approved by the American Medical Association.

Curricula of the School of Engineering and Applied Science in civil, electrical and mechanical engineering are accredited by the Engineers' Council for Professional Development.

The School of Education is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education for its Bachelor's and Master's degree programs.

The School of Government and Business Administration has maintained full membership in the Middle Atlantic Association of Colleges of Business Administration since 1961. It joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of the American Assembly of Collegiate Schools of Business. The programs in accounting satisfy the educational requirements for the Certified Public Accountant and the Certified Management Accountant professional examinations. The program in Health Care Administration is accredited by the National Accrediting Commission on Graduate Education for Hospital Administration. The Master of Urban and Regional Planning degree program is recognized by the American Institute of Planners. The Department of Chemistry is on the approved list of the American Chemical Society. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The program in speech pathology and audiology is accredited by the Education and Training Board of the American Boards of Examiners in Speech Pathology and Audiology.

UNIVERSITY POLICY ON EQUAL OPPORTUNITY

In accordance with the stated policy of its Board of Trustees and in conformity with federal laws and regulations, George Washington University does not discriminate against any person on the basis of sex, race, color, religion, or national origin in any of its education or employment programs or activities. Federal regulations implementing Title IX of the Education Amendments of 1972 call for an explicit statement that the requirement not to discriminate on the basis of sex extends to employment in and admission to such programs and activities.

Inquiries concerning the application of this policy and federal laws and regulations concerning discrimination in education or employment programs and activities may be addressed to the Office of the University's Coordinator of Equal Opportunity Programs or to the Director of the Office of Civil Rights of the Department of Health, Education, and Welfare.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the United States Information Agency, the Corcoran Gallery of Art, the Department of State, the Department of the Interior, the General Services Administration, the National Academy of Sciences, and the John F. Kennedy Center for the Performing Arts.

GOVERNMENT

The University is privately endowed and is governed by a self-perpetuating Board of Trustees, with the President of the University as an ex officio member. The members of the Board are named for a period of three years and are divided into three classes. The members of one class are elected at each annual meeting to fill the places of the members whose terms of office expire. Two members of each class are nominated by the Alumni Association.

THE GENERAL ALUMNI ASSOCIATION

The objectives of this Association are to unite the graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the University and who have left the University in good standing, or any person who is or has been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those who are life members of the George Washington University General Alumni Association or the Alumni Association of any school of the University, or are current contributors to the George Washington University Fund.

The Alumni Office is located in Alumni House, 714 21st Street, N.W., Washington, D.C. 20052.

All alumni are urged to keep the Alumni Office informed of changes of address or occupation and to supply information with regard to their fellow alumni.

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*Alumni trustee.

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Ruth H. Osborn, Ed.D., *Assistant Dean of the College of General Studies, for Continuing Education for Women*

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Michael McCally, M.D., Ph.D., *Associate Dean for Allied Health Programs of the Medical Center*

COLLEGE OF GENERAL STUDIES

Dean R.L. Holland
Associate Deans C.M. Chambers, A.C. Jensen
Assistant Dean Ruth H. Osborn

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COMMITTEE ON SCHOLARSHIP

G.M. Arkilic, B.J. Dunham, K.J. Darr, D.C. Linkowski, J.A. Morgan, E.K. Winslow

INTRODUCTION

The College of General Studies, the off-campus division of George Washington University, was established in 1950 to extend the educational resources of the University to the community. The College continues in expanding the University's activities by providing academic programs for adult students and



by helping to meet the continuing educational requirements of the National Capital area.

The College offers off-campus credit courses for the nondegree student, whether for personal enrichment or for updating or upgrading his professional credentials. Off-campus degree programs, administered by the College of General Studies for other colleges and schools of the University, are offered at the undergraduate and graduate levels for students who wish to pursue a more formal program of study. Experimental pilot programs of study are developed in cooperation with other colleges and schools of the University in response to specific needs of the government and business community. The College also develops and conducts noncredit courses, seminars, and workshops drawing on the resources of the University.

The Staff of Instruction for the off-campus programs includes members of the full-time faculty of the University and academically qualified part-time lecturers from the Washington professional community.

The College works closely with education directors, public school officials, and personnel administrators in government, business, and industry to develop courses of study and expand the educational opportunities for the mature student. In cooperation with these sponsoring groups the College offers courses at off-campus centers throughout the District of Columbia and in nearby Maryland and Virginia. Government agencies and installations, business organizations, or professional groups interested in having the College organize and conduct a course or a comprehensive educational program should contact the Associate Dean of the College of General Studies.

ACADEMIC STATUS

The academic standards of the University are maintained in off-campus credit courses.

The College of General Studies is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools.

DEGREE PROGRAMS

Columbian College of Arts and Sciences offers the following degrees off campus:

Associate in Arts in General Studies
Bachelor of General Studies
Bachelor of Science in Geodetic and Cartographic Science
Bachelor of Science in Oceanography

The Graduate School of Arts and Sciences offers the following degrees off campus:

Master of Arts in Special Studies
Master of Science in Special Studies

The School of Engineering and Applied Science offers the following degrees off campus:

Master of Engineering Administration
Master of Science
Doctor of Science

The School of Education offers the following degrees off campus:

Master of Arts in Education
Education Specialist

The School of Government and Business Administration offers the followi degrees off campus:

Bachelor of Science in Administration
Master of Science in Administration

SPECIAL CREDIT PROGRAMS AND NONDEGREE PROGRAMS

SPECIAL CREDIT PROGRAMS

Special credit courses and programs designed to meet the needs of interested individuals, groups, and agencies are offered in the liberal arts, education, and other areas. From time to time such offerings include foreign-tour programs and other programs of a continuing education nature. For further information contact one of the persons listed below.

NONDEGREE PROGRAMS

Courses, conferences, seminars, and institutes are offered to meet the needs of individuals and groups. They are designed for business, industry, and professional groups. For further information contact one of the persons listed below.

For information on programs in a general area, contact Charles Chambers, Associate Dean of the College of General Studies, telephone 676-7070.

For information on LEEP programs, contact David A. Rowley, telephone 676-6210.

For information on programs concerning women, contact Ruth Osborn, Assistant Dean of the College of General Studies, for Continuing Education for Women, telephone 676-7036.

For information on noncredit programs, contact Earl Ross, Director of Conferences and Seminars, telephone 676-7216.

For information on Teacher's Programs, contact the geographic area director (see below).

For information on programs in specific geographic areas, contact Ralph DeBelles, Director of District of Columbia Programs, telephone 676-7061; Douglas Carter, Director of Maryland Programs, telephone 676-7022; John Morrow, Director of Virginia Programs, telephone 676-7040.

Admission

NO STUDENT may be denied admission to the University because of sex, race, color, creed, or national origin.

NONDEGREE STUDENTS

Off-campus credit courses may be taken by nondegree students who meet the prerequisites prescribed by the department concerned. A student who has been dismissed or required to withdraw from this or another institution is not eligible to register for at least one fall or one spring semester from the date of such action. Formal University admission is not required for registration.

Nondegree students wishing to enroll in graduate courses other than those offered by the School of Government and Business Administration must have completed a Bachelor's degree or have completed 90 semester hours of undergraduate work and the permission of the instructor. Nondegree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

Credits earned as a nondegree student may later be transferred to degree programs at George Washington University or other colleges and universities, providing they are applicable to the desired curriculum, providing the student meets the requirements of the degree program for which he is applying, and providing all other requirements of the appropriate school are met.

ADMISSION AS A DEGREE CANDIDATE

Students wishing to be admitted as candidates for one of the off-campus undergraduate or graduate degree programs of George Washington University may obtain application forms from the College of General Studies, one of the University's off campus Representatives, or the Education Officer of their agencies or installations. For information on the procedure to be followed when applying for admission to campus degree programs, refer to the appropriate catalogue of George Washington University.

An application for admission, required credentials, and a nonrefundable application fee* of $10 (for undergraduate study) or $25 (for graduate study) should be sent to the appropriate office.

Records presented become the property of the University and *cannot* be returned.

Undergraduate Degree Candidacy—Columbian College of Arts and Sciences

Completed application, required credentials, and the application fee should be sent to the Office of Admissions, George Washington University, N.W., Washington, D.C. 20052.

Secondary school graduates applying for Associate in Arts in General Studies or Bachelor's degree candidacy must present the combined evidence of (1) an acceptable certificate of graduation from an accredited secondary school, showing a minimum of fifteen "units"† in a college preparatory or academic curriculum; (2) the principal's statement that the applicant is adequately prepared to undertake college work with reasonable prospect of success; (3) College Entrance Examination Board scores on the Scholastic Aptitude Test and the English Composition Achievement Test. The College Entrance Examination Board tests are preferred; however, the American College Testing battery scores will be accepted, (for students out of high school several years, other appropriate tests may be prescribed). The applicant should

*The application fee must be by check or postal money order, payable to George Washington University.

†The application fee is waived for graduates of this University applying to the Graduate School of Arts and Sciences, and for students applying for readmission who were registered as degree candidates at the time of their last registration at this University and who have not since registered at another institution.

†A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

request that these scores be sent to the Office of Admissions directly from the Educational Testing Service, Princeton, N.J., or Berkeley, Calif.; or from the American College Testing Program, Iowa City, Iowa.

Mature students who do not meet the above requirements may be considered for degree candidacy after the satisfactory completion of at least 15 semester hours of course work with a grade-point average of 2.00 or better. This must include courses in English Composition (Engl 9 or 10 and 11) and 9 semester hours of course work in at least two of the following appropriate areas: Humanities (literature, philosophy, foreign languages), Social Studies (anthropology, economics, geography, history, political science, psychology, sociology), Natural and Mathematical Sciences.

The selection of qualifying courses should be made in conference with the faculty adviser, and a conference concerning plans for study is required of each applicant for admission to candidacy.

ADVANCED STANDING AND ADVANCED PLACEMENT

TRANSFER STUDENTS FROM OTHER COLLEGES AND UNIVERSITIES

Properly certified courses taken at accredited colleges or universities may be applied toward a degree, subject to the curriculum requirements of the degree program and the rules of the Columbian College of Arts and Sciences.

Although a grade of *D* is not acceptable for transfer, the course may be used to satisfy a curriculum requirement. Credits completed with a *D* grade may not, however, be counted toward the total number of semester hours required for the degree. Any course completed with a grade of *D* or better may not be repeated for the purpose of earning degree credit.

Transfer students whose previous academic records raise doubts of their ability to complete degree requirements successfully must complete 15 hours of course work in this College with a quality-point index of 2.00 or higher, to be considered for degree candidacy. Courses taken to qualify for candidacy must be distributed over two or more of the following areas: Humanities (literature, philosophy, foreign language), Social Studies (anthropology, economics, geography, history, political science, sociology), and Natural and Mathematical Sciences. (Students who have not successfully completed an acceptable college course in English Composition must include Engl 9 or 10 and 11.) Applicants who have been suspended for academic reasons from this University or another institution must fulfill this same 15-hour requirement and also obtain written approval of a petition for admission to degree candidacy from the Committee on Admission and Advanced Standing of Columbian College of Arts and Sciences.

The University reserves the right to refuse credit for transfer in whole or in part, or to allow it provisionally. Credit so given may be withdrawn for subsequent poor work.

It is the responsibility of the student to have an official transcript sent directly from each institution formerly attended to the Office of Admissions, George Washington University, Washington, D.C. 20052.

EARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

In addition to credit allowed in transfer from other accredited colleges or universities, a maximum of 30 semester hours of advanced standing may be obtained by any one or any combination of the following methods.

A student may earn up to a maximum of 30 hours, or waive curricular requirements without limitation *(passing a waiver examination does not entitle the student to any semester hours of credit)*, by performing satisfactorily on any or all of the following:

Advanced Placement Tests (APT).—Administered by the College Entrance Examination Board.

Achievement Tests (may be used to waive requirements only).—Administered by the College Entrance Examination Board.

College-Level Examination Program (CLEP).—CLEP offers two types of examinations: General and Subject Examinations. CLEP General Examinations are offered in five areas: mathematics, social sciences, humanities, natural sciences, and English composition. CLEP Subject Examinations measure achievement of specific college-level courses and are offered in more than 20 subjects.

Upon admission to degree candidacy, credit is assigned for the General Examinations, with the exception of the English composition examination, passed at the 50th percentile or above (college sophomore norms). Credit is assigned for the Subject Examinations passed at the level recommended in the CLEP Subject Examinations model policy or Council on College Level Examination Model Policy. A candidate for a degree must seek departmental approval prior to taking the examination to receive credit for a CLEP Subject Examination. Credit may not be earned by passing the examination after having taken the equivalent course. Arrangements for the examinations are the responsibility of the applicant and should be made with the College Entrance Examination Board, Box 1824, Princeton, N.J. 08540.*

Special Departmental Examinations in Columbian College of Arts and Sciences.—A student may request any department of Columbian College to offer him a special examination covering the subject matter of any specific course. Approval is not automatically granted; the student must offer evidence that he has sufficient background to have a reasonable command of the subject matter. (A student who has previously taken examinations to waive course requirements may not subsequently take examinations for credit in the same courses.) If a CLEP Subject Examination is available, the department may choose to employ it. Assigning credit (advanced placement) or waiver of a requirement by special departmental examinations will depend on the department's evaluation of the examination paper. Special departmental examinations will normally be of at least three hours' duration. A $25 fee is charged for preparation, administration, and grading of each course examination.

Service Schools.—A maximum of 30 (or a maximum of 12 hours if the courses are "professional") semester hours may be obtained on the basis of service schools satisfactorily completed, as evaluated in accordance with the *Guide to the Evaluation of Educational Experience in the Armed Forces.* Ordinarily such subjects are counted as electives. No credit will be allowed for military experience as such.

Correspondence Courses.—A maximum of 15 semester hours may be earned through the successful completion of correspondence courses of college level

* CLEP examinations in Introductory Accounting, Introduction to Business, Commercial Law, and Data Processing are limited to 3 credits each of advanced standing in the School of Government and Business Administration. All other CLEP examinations in Accounting and Business Administration (School of Government and Business Administration courses) are not accepted for advanced standing.

which are offered by the U.S. Armed Forces Institute or a regionally accredited college or university.

Examination for Waiving Curriculum Requirements.—A student wishing to omit a required course may, with the permission of the faculty adviser, take a waiver examination, the passing of which relieves him of the curriculum requirement and qualifies him for registration in an advanced course. The fee for each 3-hour course examination is $5.

Credit Earned Through United States Armed Forces Institute (USAFI) or Defense Activity for Non-Traditional Education Support (DANTES).—Credit is assigned for approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

Undergraduate Degree Candidacy—School of Government and Business Administration

Completed application, required credentials, and the application fee should be sent to the Office of Admissions, George Washington University, Washington, D.C. 20052.

Requirements for admission for secondary school graduates are as follows:

(A) 1. An acceptable certificate of graduation from a U.S. secondary school showing at least 15 units* which must include four years of English; at least two years of one foreign language; two years of science, preferably with laboratory instruction; two years of social studies, one of which must be American history; and two years of college preparatory mathematics. Students admitted with deficiencies in secondary school units will be required to begin removing such deficiencies by appropriate courses or examinations within the first year in which they are enrolled in this University.

International students may be considered for admission with an equivalent foreign secondary certificate. A student presenting such a certificate must also show competence in the English language and may be required to enroll in a full-time program in English before beginning studies in a degree program.

2. College Entrance Examination Board scores submitted on the Scholastic Aptitude Test and the English Composition Achievement Test.

It is recommended that the examinations be taken in December or January. Scores on tests taken in the junior year may be submitted. Arrangements for tests are the responsibility of the applicant and should be made with the Educational Testing Service, 20 Nassau St., Princeton, N.J. 08540 or 1947 Center St., Berkeley, Calif. 94704, not less than one month before the date of the test. In applying for the test, the applicant should specify that the scores be sent to the Office of Admissions, George Washington University, Washington, D.C. 20052.

The College Entrance Examination Board tests are preferred; however, the American College Testing battery scores will be accepted. The applicant should request that these scores be sent to the Office of Admissions directly from the American College Testing Program, Iowa City, Iowa. It is recommended that the applicant take the tests in October of the senior year.

The School of Government and Business Administration will consider the

* A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

adequacy of the qualifications of an applicant who, because of unusual circumstances, does not present all of the formal requirements stated above. The School may prescribe appropriate scholastic-aptitude tests of the University.

(B) Students who have been out of secondary school for three years or more and/or do not meet the above requirements may take a special battery of admission tests* by contacting the Office of Admissions or may be considered for admission to the School of Government and Business Administration on a conditional basis. To be admitted into the School's degree program, a conditionally admitted student must complete a trial program of 15 semester hours of course work with a quality-point index of 2.5 or higher. This trial program must include one course each in accounting, economics, English and science, to be selected from the first-year curriculum of the Bachelor of Science in Administration degree program.

The selection of courses to be taken in the trial program must be made in conference with a faculty adviser in the School of Government and Business Administration. A conference concerning plans for study as a degree candidate is required of each applicant at the beginning and end of the trial program. Upon successful completion of the trial program, the student who has submitted a degree-candidate application will be advanced to degree status.

Admission with Advanced Standing

Requirements for admission of students transferring from other regionally accredited colleges and universities and from other divisions of this University are as follows:

(A) Students who have accumulated 30 hours or more of academic credit at another regionally accredited college or university in which they earned a 2.00 or higher quality-point index may be admitted to the School of Government and Business Administration. Advanced standing may be awarded for properly certified courses taken at regionally accredited colleges or universities for which the student received a grade of *C* or better and may be applied toward a degree provided that they are comparable to the curricular requirements of the degree.

In no case will more than 60 semester hours of advanced standing be granted for course work completed at regionally accredited community or junior colleges. Accounting and business administration courses taken at such colleges may be applied toward the Bachelor of Science in Administration degree provided they are comparable to BAd 161, Mgt 118, 119 or Stat 97. Other courses (one course per area up to a maximum of three courses), comparable to this School's courses numbered 101–200, taken at an accredited community or junior college where a grade of *C* or better has been earned may be accepted to waive certain required courses. The waiver of a required course does not entitle the student to any semester hours of credit.

Although a grade of *D* is not acceptable for transfer, the course may be used to satisfy a curricular requirement. Credits earned with a *D* grade may not, however, be counted toward the total number of semester hours required

*These tests include, among others, the Differential Aptitude Test, Cooperative English Examination and Ohio Psychological Test.

for the degree. Any course completed with a grade of *D* or better ma not be repeated for the purpose of earning degree credit.*

The School reserves the right to refuse credit for transfer in whole or part or to allow credit provisionally.

It is the responsibility of the student to have an official transcript sent d rectly from each institution formerly attended to the Office of Admissio George Washington University, Washington, D.C. 20052.

(B) Students may transfer into a degree program in the School of Gover ment and Business Administration after completing at least 12 or more seme ter hours in another degree-granting division of this University provided th student has an accumulated quality-point index of 2.00 or higher at the tim of transfer. A student wishing to transfer into the School from another div sion of this University must submit a formal application of transfer to th Office of Admissions.

Courses taken at another division of this University may be applied toward a degree in this School provided they are comparable to the curricular require ments of the degree. A maximum of 90 semester hours of transfer credit ma be applied toward a degree program in this School.

(C) Students applying for transfer from another accredited college or uni versity, or from another division of this University whose previous academ records raise doubts of their ability to complete degree requirements success fully may be admitted to the School of Government and Business Administra tion on a conditional basis. To be admitted into the School's degree progra a conditionally admitted student must complete a trial program of 15 semester hours of course work with a quality-point index of 2.5 or higher. A studen registered in another division of this University who has an accumulated quality-point index of less than 2.00 and who is conditionally admitted to this School must earn a 2.5 quality-point index in the trial program and must dur ing this trial program bring the accumulated quality-point index to 2.00 o higher to be admitted to the School's degree program.

The selection of courses to be taken in the trial program must be made in conference with a faculty adviser in the School of Government and Business Administration. A conference concerning plans for study as a degree candidate is required of each applicant at the beginning and end of the trial program. Upon successful completion of the trial program, the student who has sub mitted a degree-candidate application will be advanced to degree status.

CORRESPONDENCE AND HOME-STUDY COURSES

Credit for correspondence or home-study courses is not acceptable and cannot be applied toward a degree in the School of Government and Business Administration.

EARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

A student may earn credit up to a maximum of 30 semester hours or waive curricular requirements by performing satisfactorily on the following tests

* An exception to this rule is the freshman English composition requirement. Any student earning a grade lower than *C* in English composition at another institution may be required to repeat the course(s) at this University.

College-Level Examination Program (CLEP).—CLEP offers two types of examinations: (1) CLEP Subject Examinations are offered in 29 subject areas. These tests measure achievement in the equivalent of specific college-level courses. (Credit may not be earned by passing the examination after having taken the equivalent course.) CLEP examinations in Introductory Accounting, Introduction to Business, Commercial Law and Data Processing are limited to three credits each of advanced standing. All other CLEP examinations in Accounting and Business Administration (School of Government and Business Administration courses) are not accepted for advanced standing. Students enrolled in George Washington University who wish to receive credit for CLEP Subject Examinations must receive prior approval of the department. (2) CLEP General Examinations are offered in five areas: mathematics, social studies, humanities, the natural sciences and English composition. Credit—advanced standing—is not given for the General Test in English composition.

Advanced Placement Tests (APT).—Administered by the College Entrance Examination Board.

Achievement Tests (may be used to waive requirements only).—Administered by the College Entrance Examination Board.

Examinations for Waiving Curriculum Requirements.—The School of Government and Business Administration does not administer waiver examinations. However, certain liberal arts courses may be waived and in some instances credit may be assigned by satisfactorily passing a special departmental examination.

Graduate Degree Candidacy

MASTER'S DEGREES

The Degree of Master of Arts in Education (School of Education).—Application for Master's degree candidacy should be filed by June 1 for the fall semester, April 1 for the summer session, or November 1 for the spring semester. Completed application, required credentials, and the application fee should be sent to the Office of the Dean, School of Education, 2201 G Street, N.W., Washington, D.C. 20052.

Admission to graduate study toward a Master's degree requires a bachelor's degree from an accredited institution, an undergraduate quality-point index of 2.50 (a C + average) or above, demonstrated interest in education, appropriate undergraduate work, and personal traits that show promise as an educator. Two years of successful teaching are required before admission to candidacy in the field of school administration. Experience is required for admission to programs in adult education and human resource development.

The Degree of Master of Science in Administration (School of Government and Business Administration).—Forms for application for admission or readmission are available at the Office of the Admissions Officer, School of Government and Business Administration, George Washington University, Washington, D.C. 20052. When completed, application forms should be submitted to this office no later than April 1 for the fall semester, November 1 for the spring semester, and April 1 for both summer sessions. Applicants who received their undergraduate degrees from foreign universities must submit applications one month earlier in each case.

To be eligible for admission applicants must present the following minimu credentials: a bachelor's degree from a regionally accredited college or univ sity that includes at least 90 semester hours of academic work with an over undergraduate quality-point index of 2.5 (on a 4.00 scale) and a score of least the 50th percentile on the applicable admission test.

Applicants must submit scores on the Graduate Management Admissi Test (GMAT).* It is the responsibility of the applicant to make arrangeme for the test with the Educational Testing Service, Princeton, N.J. 08540. C respondence concerning the Graduate Management Admission Test should addressed to Box 966; concerning the Graduate Record Examination, to B 955.

Applicants whose undergraduate quality-point index is less than 2.5 or who Graduate Management Admissions Test score ranks beneath the 50th percen tile will be admitted if (1) the quality-point index multiplied by 200 and adde to the GMAT score equals 950 points or (2) the upper division undergraduat (last two years of undergraduate work) quality-point index multiplied by 20 and added to the admissions test GMAT score equals 1,000 points.

Waiver of the admission test may be requested, by letter, by applicants whos undergraduate quality-point index was 3.0 or better and whose undergradua degree was conferred no more than 5 years previously and whose undergradu ate major was in a discipline which supports the graduate program for whic application is made. The Admissions Committee will inform the applica whether or not a waiver will be granted.

A maximum of one-quarter of the semester hours of graduate course wor required for the degree may be approved for transfer to the School of Govern ment and Business Administration from the Division of University Students the College of General Studies, another degree-granting division of this Un versity or another accredited college or university under the following condi tions: the course work must be approved as part of the student's program o studies, it must not have been applied to the completion of requirements for another degree, it must be graduate-level course work, it must have been taken within the past two years and the student must have received a grade of *B* or better. This action must be approved by a petition to the adviser and the Dean. A transcript of the course work must be on file before the petition can be con sidered. The transfer of credit rule applies to course work taken at this Uni versity in nondegree status. The letter of admission will designate a specific semester at the beginning of which degree candidacy commences. Combined transfer credit at that point may not exceed 9 semester hours.

The Degrees of Master of Arts in Special Studies or *Master of Science in Special Studies (Graduate School of Arts and Sciences).*—These Master's de gree off-campus programs are arranged for groups of students participating in particular program which has been approved by the Graduate School of Arts and Sciences. Application for Master's degree candidacy must be made by mem bers of the group before registration. Completed application, required creden tials, and the application fee should be sent to the Office of the Dean, Graduate School of Arts and Sciences, 2000 H Street, N.W., Washington, D.C. 2005

Admission to graduate study toward a Master's degree in this School requires a bachelor's degree, from an accredited college or university, with an over-a quality-point index of 3.00 (a *B* average) or an equivalent grade.

* Applicants for the concentration in Public Administration may substitute scores on the Graduate Record Examination or the Miller Analogies Test.

A maximum of 9 semester hours of advanced standing may be credited toward a Master's degree by transfer of credit for approved graduate course work taken at an accredited college or university or in nondegree status at this University.

The Degrees of Master of Science or *Master of Engineering Administration (School of Engineering and Applied Science).*—Application for Master's degree candidacy *must* be made before registration. Completed application, required credentials, and the application fee should be sent to the Manager of Engineering Admissions, School of Engineering and Applied Science, 725 23rd Street, N.W., Washington, D.C. 20052.

Admission to graduate study toward a Master's degree requires an appropriate bachelor's degree from a recognized institution and evidence of capacity for productive work in the field selected, as indicated by undergraduate grades, Graduate Record Examination scores, and similar data.

An applicant who has significant deficiencies in preparation may be required to take prescribed undergraduate courses as an unclassified student before being admitted to graduate student status. In some cases, if such deficiencies are minimal, he may be admitted to graduate student status and allowed to take a limited number of graduate courses while completing the undergraduate courses in which he is deficient. In no case may the undergraduate courses thus taken fulfill any part of the requirements for the Master's degree.

Students wishing to apply for admission to the program of study leading to the degree of Master of Engineering Administration must meet the following additional admission requirements: (1) the applicant must have an adequate knowledge of the principles of human relations, the fundamentals of engineering economic analysis, and the fundamentals of quantitative methods. This requirement can be met by satisfactory completion of the following undergraduate courses or approved equivalents: EAd 150, *Introduction to Engineering Administration;* EAd 160, *Introduction to Engineering Economic Analysis;* and EAd 170, *Basic Quantitative Methods for Engineering Administration.* (2) The applicant may be required to complete other undergraduate prerequisite courses prescribed as a condition of admission. (3) A student is required to earn the grade a *C* or better in these courses (unless the requirement is stipulated to be a grade of *B* or better upon admission) in each undergraduate prerequisite course. If this scholarship requirement is not met, the student is barred from further enrollment. A student is not permitted to repeat any of the undergraduate prerequisite courses. Credit for prerequisite courses is not applicable toward the degree of Master of Engineering Administration.

Up to 6 semester hours of satisfactory credit (with grades of *A* or *B*), which normally must have been earned in a graduate program at another recognized institution, *may* be accepted in transfer, when applicable, to satisfy Master's degree requirements in the School of Engineering and Applied Science. However, the student must, with the approval of his adviser, petition to the appropriate department chairman for such a transfer.

EDUCATION SPECIALIST DEGREE

The Degree of Education Specialist (School of Education).—Each applicant must be interviewed and recommended by a staff member of the School of Education or by a representative in the candidate's locality appointed by the Dean. Admission requires a Master of Arts in Education degree from this University

(or the equivalent), a satisfactory score on the Miller Analogies Test or th Graduate Record Examination, or grades in graduate course work which mee standards set by the Advanced Graduate Faculty and two years of successfu pertinent experience. Completed application, required credentials, and the ap plication fee should be sent to the Office of the Dean, School of Education George Washington University, Washington, D.C. 20052.

DOCTOR OF SCIENCE DEGREE

The Degree of Doctor of Science (School of Engineering and Applied Science).—The prospective doctoral student seeking admission should apply before June 1 for the fall semester and before December 1 for the spring se mester. Personal interviews may then be arranged to discuss the applicant's qualifications and the possibilities for an effective doctoral program. The appli cant must arrange for complete documentary records (transcripts) to be for warded to the Manager of Engineering Admissions, School of Engineering and Applied Science, 725 23rd Street, N.W., Washington, D.C. 20052, in sufficient time to permit assembly of complete records for evaluation as soon after the above application deadlines as possible.

To be admitted to the doctoral program, a satisfactory Master's degree from an accredited institution is required, together with acceptable personal qualities and a capacity for creative scholarship. Normally, a *B* average in graduate work is required. However, the minimum does not assure automatic accept ance; the departments may, and often do, set higher admission standards. The applicant must arrange for letters of recommendation to be submitted from two faculty members of the institution from which he received his Master's degree one of these, if possible, should be from his Master's adviser. The letter should be addressed to the appropriate department chairman.

Up to 6 semester hours of credit earned in courses completed with the grade of *A* or *B* while enrolled in a doctoral program at another accredited institu tion may be accepted in transfer to satisfy doctoral requirements at this School subject to the approval of the student's adviser and his department chairman. Credit earned in courses completed more than five years prior to admission to the doctoral program will not be accepted in transfer, and some departments may require that transfer credit must have been earned within a shorter period of time before admission.

Readmission

A student who withdraws, is suspended, or is otherwise absent from the Univer sity for one or more spring or fall semester, must make formal application for readmission. If readmitted, the student is subject to the rules and regulations in force at the time of return. Complete and official transcripts from each institution the student has attended since making the previous application must be sent to the appropriate office at this University before the application for readmission can be evaluated.

When there are curriculum changes in graduate programs in the School of Government and Business Administration, the readmitted student may be re quired to take additional course work in preparation for the Master's Compre hensive Examinations.

Registration

OFF-CAMPUS REGISTRATION is conducted before or at the first class meeting of each course, at times and places stated in the *Off-campus Schedule of Classes*, available well in advance of each semester.

Registration in an off-campus course *constitutes admission to that course only*. It does not admit the student to campus courses or to degree candidacy. Only students admitted to degree candidacy may enroll as full-time students (for 12 semester hours or more). Those who have been graduated from high school recently and wish to be *full-time freshman* students at this University should apply for admission to the appropriate college or school on campus.

Off-campus degree candidates in an area of concentration with a small enrollment which would not justify offering courses off campus may have to register for campus courses in order to meet the requirements for the degree. Permission must be secured from the College of General Studies at least two weeks prior to registration for courses in the School of Government and Business Administration.

Auditing.—With the permission of the instructor, students may register as "Auditors." An auditor is not required to take active part or to take examinations; he receives neither grades nor credit. Tuition is the same for the auditor as for the student registered for credit. With the approval of the Dean, a student may change from credit to audit status during the first third of the semester. A student who takes a course as an auditor may not repeat it later for credit.

Concurrent Registration.—A student registered as a degree candidate in any other college or school of the University may take credit courses in the College of General Studies *only by permission (granted prior to registration) of the dean* of the college or school concerned. A "College of General Studies Off-campus Concurrent Registration Permit" form must be obtained from the appropriate college or school, signed by the dean of that college or school, and presented at the time of registration in the College of General Studies.

Service personnel enrolled full time for campus courses need the permission of the Dean of the College of General Studies to register concurrently for off-campus courses.

Any student taking course work in another college or school of the University or at another institution through the Consortium of Universities of the Washington Metropolitan Area, Inc., must have the permission of his dean.

Fees and Financial Regulations

FEES should be paid by check or money order, made payable to George Washington University. The student identification number should appear in the upper left-hand corner.

The following fees were adopted for the academic year 1976–77. (See pages 30 for projected tuition and fee increases for 1977–80.)

Tuition*

On campus:

Part-time undergraduate program, for each semester hour .....

Graduate study other than in the School of Engineering and Applied Science, for each semester hour .....

Graduate study in the School of Engineering and Applied Science, for each semester hour .....

Off campus:†

For each semester hour .....

School of Engineering and Applied Science off-campus programs, for each semester hour‡ .....

ICAF programs, for each semester hour .....

Thesis:§

ICAF programs, for each semester hour .....

Master of Arts in Education and Master of Science in Administration degree programs (other than ICAF), for each semester hour .....

School of Engineering and Applied Science programs, for each semester hour‡ .....

University Center Fee (charged only to students registered on campus, nonrefundable)

For students registered for 11 or more semester hours on campus:

For each semester .....

For students registered for less than 11 semester hours in a semester on campus:

For each semester hour for which the student registers .....

For on-campus degree candidates maintaining "continuous registration" status:

For each semester .....

Special Fees

Application fee (undergraduate degree candidate), nonrefundable .....

Application fee (graduate degree candidate), nonrefundable .....

Graduation fee, due and payable at the time of registration for the last semester or summer session:

Associate's degree .....

Bachelor's, Master's and Doctor of Science degrees .....

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* Students interested in full-time undergraduate study on campus should consult the appropriate catalogue (*Undergraduate and Graduate Catalogue, School of Engineering and Applied Science Catalogue*, or *School of Medicine and Health Sciences Catalogue*).

† Except for ICAF and School of Engineering and Applied Science programs.

‡ This fee does not apply to special off-campus programs arranged with the School of Engineering and Applied Science.

§ Payment of tuition for a Master's thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted in accordance with the regulations of the school in which the student is registered. (See page 40 for regulations governing military leave.)

Special Columbian College of Arts and Sciences departmental examination fee, for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	$25.00
Continuous Registration fee, *off-campus degree candidates (other than those in the School of Engineering and Applied Science),* to maintain "continuous registration" during any semester of absence from the University*	74.00
Continuous Registration fee, *on-campus or off-campus,† degree candidates in the School of Engineering and Applied Science,* to maintain "continuous registration" during any semester of absence from the University or after completion of tuition requirements*	100.00
Continuous Registration fee, *ICAF degree candidates,* to maintain "continuous registration" during any semester of absence from the University*	85.00
Late-registration fee, for failure to register for campus courses within the designated period	15.00
Fee for binding two copies of the Master's thesis (other than ICAF programs)	10.00
Fee for binding two copies of the Master's thesis (ICAF) programs)	7.00
Fee for Microfilm Service and Printing Announcement of Final Examination (Doctor of Science candidates)	60.00
Late-payment fee, for failure to make payments when due (see "Payment of Fees," pages 31–32)	15.00
On-campus financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 31–32)	35.00
Off-campus financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 31–32)	15.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, returned by the bank for insufficient funds, or for any other reason	15.00
Fee for each examination to waive a curriculum requirement	5.00
Transcript fee, for each transcript of record	2.00
If two or more transcripts are requested at the same time, fee for each of the first two copies is $2.00 each, fee for each additional copy	.50
Replacement of lost or stolen picture identification card	2.00

PROJECTED TUITION AND FEE INCREASES 1977–80

Projected increases for the academic years 1977–78, 1978–79, and 1979–80 have been estimated as follows:

* Payment of the continuous registration fee entitles the student who is granted leave of absence to return and continue his work toward a degree under the academic requirements which were in force at the time of his first registration. The continuous registration fee applies toward neither tuition fee nor residence requirements for the degree. This fee does not apply to students granted military leave (see page 40).

† This fee does not apply to special off-campus programs arranged with the School of Engineering and Applied Science.

On Campus*

† Increase by semester hour (graduate and part-time undergraduate students):

1977–78 .....
1978–79 .....
1979–80 .....

Off Campus

† Increase by semester hour (except ICAF and School of Engineering and Applied Science programs):

Course Work Other than Thesis

1977–78 .....
1978–79 .....
1979–80 .....

Thesis for Master of Arts in Education and *Master of Science in Administration programs*

1977–78 .....
1978–79 .....
1979–80 .....

† Increase by semester hour (ICAF programs including thesis):

1977–78 .....
1978–79 .....
1979–80 .....

†‡ Increase by semester hour (School of Engineering and Applied Science programs including thesis):

1977–78 .....
1978–79 .....
1979–80 .....

PROJECTED TUITION AND FEE INCREASES

It is not possible to project future economic data with certainty. The increases outlined above are merely estimates based on present circumstances and should in no way be interpreted as fixed limits on tuition increases. The University hopes to keep tuition increases as low as possible, but it is obligated to maintain a sound financial basis. Economic conditions in the recent past, particularly as they affect private educational institutions, have been extremely variable and significant increases in tuition in excess of the above limits may be required

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* Students interested in full-time undergraduate study on campus should consult the appropriate catalogue (*Undergraduate and Graduate Catalogue, School of Engineering and Applied Science Catalogue*, or *School of Medicine and Health Sciences Catalogue*).

† Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

‡ This increase by semester hour does not include the projected increases for special off-campus programs arranged with the School of Engineering and Applied Science.

PAYMENT OF FEES

OFF-CAMPUS COURSES

Fees for each semester are due and payable in full at the time of each registration; however, a student registering for a *thirteen-week credit course* may sign a deferred payment contract at each registration to make payments in three equal installments—one-third at the time of registration, one-third by October 5, 1976, and one-third by November 5, 1976 (for the fall semester); one-third by February 10, 1977 and one-third by March 10, 1977 (for the spring semester). Payments are due at the stipulated times. Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the beginning of each semester to the date payment is made.

Students receiving partial government tuition assistance must pay their portion of the tuition in full at the time of registration.

Except for specified special sessions, tuition and fees for credit courses lasting less than twelve weeks, and for all noncredit courses, are payable in full at registration.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to an interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his rights to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $15.

Students auditing courses are subject to all fees charged to students registered for credit.

CAMPUS COURSES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made out to George Washington University. The financial credit is made by student number. It is therefore essential that the student identification number appears in the upper left hand corner of the check.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 27, 1976 (for the fall semester) and March 9, 1977 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign

deferred payment contracts unless the total tuition and fee charges exceed th value of the tuition awards by $600 or more. Under such circumstances th student may be permitted to pay one-half of the amount due from the studen at the time of registration and to defer the balance by signing a deferred pa ment contract.

Students who fail to make any payment when due will be automatica charged a $15 late-payment fee and will be subject to the interest charge of per cent per annum. Accounts which become 30 days past due will be finan cially encumbered. In the event a student's account is financially encumbered the student forfeits his rights to the use of deferred payment contracts in fu ture semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and othe academic information until the account is settled financially. Financial settle ment will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students regis tered for credit.



REFUND OF FEES FOR OFF-CAMPUS REGISTRATION*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the dean of the college, school, or division in which the student is registered. Notification to an instructor is not an acceptable notice.

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges will be made in accordance with the following schedule for the academic year:

REFUND SCHEDULE 1976–1977

Long Session (or any session longer than 13 weeks)

90% Starting date of class plus 6 calendar days
75% Starting date of class plus 20 calendar days
50% Starting date of class plus 34 calendar days
0% Starting date of class plus 35 calendar days to end

Short Session (7 weeks, 2 days per week)

90% Starting date of class plus 2 calendar days
75% Starting date of class plus 8 calendar days
50% Starting date of class plus 15 calendar days
0% Starting date of class plus 16 calendar days to end

Mini Session (3 weeks)

90% Starting date of class plus 1 calendar day
75% Starting date of class plus 5 calendar days
50% Starting date of class plus 9 calendar days
0% Starting date of class plus 10 calendar days to end

No refund will be awarded for sessions of less than 21 days.

No exceptions will be made for holidays, late registration, absences, or class scheduling for any reason whatsoever.

A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for withdrawals from the University (see above). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 40).

In no case will tuition be reduced or refunded because of absence from class.

Payment applies only to the semester for which a registration charge is in-

* For regulations concerning refunds of fees for students who register for courses on campus, see the *Undergraduate and Graduate Catalogue*, the *School of Engineering and Applied Science Catalog*, or the *Summer Sessions Catalogue*.

curred and will not be credited to another semester (exception: students granted military leave, see page 40).

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Regulations

CAMPUS STUDY

OFF-CAMPUS DEGREE CANDIDATES may register for campus courses approved for their programs if these courses are not available at off-campus centers. Students must notify the Office of Student Records, College of General Studies, telephone 676–7017, at least two weeks prior to the date of campus registration so that registration materials may be prepared. This material may be picked up by the student at Building K, 817 23rd Street, N.W., during registration.

A student may register for on-campus courses as a nondegree student in the Division of University Students, telephone 676-6370.

ACADEMIC WORKLOAD

Only students admitted to degree candidacy may enroll as full-time students, i.e., for 12 or more hours in a semester. Students taking course work to qualify for degree candidacy who are registered in this College may not take more than 10 hours in a semester.

A full-time undergraduate student in Columbian College of Arts and Sciences who is not on probation may not ordinarily take more than 17 semester hours. A student employed more than 20 hours a week, who is not on probation, may not take more than 10 hours.

A full-time undergraduate student in the School of Government and Business Administration who is not on probation may not ordinarily take more than 15 semester hours. A student employed more than 24 hours a week, who is not on probation, may not take more than 9 semester hours.

A full-time undergraduate student who is a candidate for a degree in the School of Government and Business Administration and whose quality-point index is 3.50 or higher may take up to 18 hours. An employed undergraduate student who meets the same standard may take up to 12 hours.

A full-time undergraduate student who is a candidate for a degree in Columbian College of Arts and Sciences and who, during the immediately preceding semester, has received no grades below *B* and has earned grades of *A* in three courses totaling at least 9 semester hours may take 18 or 19 hours. An employed undergraduate student who, during the immediately preceding semester, has no grades below *B* and has earned grades of *A* in two courses totaling at least 6 semester hours may not take more than 12 hours.

A student on probation normally may not take more than 3 semester hours.

A student who accepts employment after registration or at any time during a semester must report that fact immediately to the Dean so that his program may be adjusted, if necessary.

A full-time graduate student who is a candidate for a degree in the School of Government and Business Administration may not take more than 12 se-

mester hours. A graduate student who is employed more than 20 hours a week may not take more than 6 hours.

A full-time student in the Graduate School of Arts and Sciences registers for 9 to 12 semester hours each semester; a part-time student must register for 6 semester hours each semester. These requirements do not apply when a student has fewer than 9 semester hours (full-time) or 6 semester hours (part-time) remaining to complete his program. A full-time student may not take more than 15 semester hours during any one semester.

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered.

The student is held responsible for all the work of the course in which he is registered, and all absences must be excused by the instructor in charge before provision is made for the student to make up work missed.

SCHOLARSHIP

GRADES

Grades are mailed to the student through the Office of the Registrar at the close of each semester. They are not given out by instructors or the administrative staff.

UNDERGRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit; *NC*, No Credit. Except for courses which specifically state that repetition for credit is permitted, a student may not repeat for credit a course in which the student has received a grade of *D* or better, unless required to do so by the department concerned. A written statement to this effect must be submitted to the Registrar by the appropriate departmental chairman.

GRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *CR*, Credit; *W*, Authorized Withdrawal. Except for courses which specifically state that repetition for credit is permitted, a student taking School of Education and School of Government and Business Administration courses may not repeat for credit a course in which he has received a grade of *C* or above. A student taking a Graduate School of Arts and Sciences course may repeat for credit a course in which he has received a grade of *C* or above only when permitted to do so by the department concerned, unless the course description states that the course may be repeated for credit. A written statement to this effect must be submitted for approval to the Dean's Office. It is then filed with the Registrar. A student taking School of Engineering and Applied Science courses may not repeat for credit a course in which he has received a grade of *C* or above, unless required to do so by the department concerned; a written statement requiring the student to repeat such a course for credit must be submitted to the Registrar by the appropriate department chairman.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Whenever a grade has not been assigned, the symbol *I* (Incomplete), the symbol *W* (Authorized Withdrawal) or the symbol *F* (Unauthorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given the instructor for the student's inability to complete the required work of the course. At the option of the instructor, the grade of *I* may be recorded if a student, for reasons beyond the student's control, is unable to complete the work of the course and if the instructor is informed of, and approves such reasons before the date when grades must be reported. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, the instructor may initiate an appropriate grade change.

REMOVING AN INCOMPLETE

For information concerning the removal of a grade of Incomplete from a student's record, consult the regulations of the college or school (see pages 69, 72, 74 and 84).

QUALITY-POINT INDEX*

Quality points are computed from grades as follows:

For each semester hour of the letter grade—*A*, 4 points; *B*, 3 points; *C*, 2 points; *D*, 1 point; *F*, no points.

Scholarship is computed in terms of the quality-point index. This is done by dividing the total number of quality points by the total number of semester hours for which the student has registered. Example: if a student received an *A* in one three-credit course, and a *B* in another three-credit course, he would compute his quality-point index this way:

A = 4 x 3 (semester hours) =	12
B = 3 x 3 (semester hours) =	9
6	21 ÷ 6 = 3.5 quality-point index

Courses marked *W, I, CR, or NC* are not considered in determining the index, except that courses marked *I* will be considered when a formal grade is recorded. Grades in courses taken at other institutions are not considered in computing the quality-point index.

WARNINGS†

At stated intervals during the academic year students who are doing work of *D* grade or lower in courses with departmental numbers below 100 receive

* Not applicable to Columbian College or to graduate study in the School of Engineering and Applied Science.

† Not applicable to the School of Government and Business Administration.

"warnings." A "warning" constitutes notice to the student that he must consult his instructor and his adviser at the earliest opportunity. "Warning periods" are established during the seventh and eighth weeks of thirteen-week courses, and during the third and fourth weeks of six and a half week courses.

PROBATION

Undergraduate Probation in the School of Government and Business Administration.—A student whose cumulative quality-point index falls below 2.00 after completing a minimum of 12 semester hours of study will be placed on probation. This probation extends over the period in which the student attempts 12 semester hours of work, which may include remedial studies as prescribed.

Undergraduate Probation in Columbian College of Arts and Sciences.—A student who is not suspended or on probation is considered to be in good standing. A student* who in one semester receives two grades of *F* in courses carrying 3 or more semester hours of credit each, or the equivalent, is placed on probation. A student in his first semester on probation who receives one grade of *F* in such a course will be continued on probation for a second semester. Two grades of *D* will be treated as equivalent to one grade of *F* in determining probation. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a part of the record for the semester during which the *I* is removed. A student on probation taking 12 or more semester hours whose grades are all C or better is removed from probation.

Graduate Probation in the School of Government and Business Administration.—A student who has attempted 12 or more semester hours and whose quality-point index is below 3.00 is placed on probation for the period in which 12 additional semester hours of work are attempted. If the quality-point index is still below 3.00 at the end of the probationary period, the student is suspended. If, after probation is removed, a student's quality-point index again falls below 3.00, he is suspended.

SUSPENSION

Undergraduate Suspension in the School of Government and Business Administration.—A student whose quality-point index is 1.50 or below or whose index remains below 2.00 at the end of the probationary period may be suspended. A student suspended for poor scholarship may apply for readmission after the lapse of either the fall or spring semester. To be considered for readmission, the student must pass prescribed tests and submit evidence to the Dean's Council of conduct during absence from the University which indicates that the student will profit from readmission. A student readmitted after suspension is on probation and must maintain a current quality-point index of at least 2.50 on each 12 semester hours of work undertaken until the cumulative

*The rules governing probation and suspension are applicable as stated to students enrolled for a full-time program (12 semester hours or more) during the fall or spring semester. Students enrolled for less than 12 semester hours during the fall or spring semester and students enrolled during the summer sessions are subject to probation or suspension on the basis of their record for 12 semester hours, or multiples thereof, rather than on their record in any one semester.

index is 2.00. In no case will the probationary period after readmission exce 24 hours of study. A student suspended twice for poor scholarship will not readmitted.

Undergraduate Suspension in Columbian College of Arts and Sciences.— student* who in one semester receives grades of *F* in three courses carrying or more semester hours of credit each, or the equivalent, is suspended. A st dent in his first semester on probation who receives two or more grades of *F* such courses is suspended. A student who receives one or more grades of *F* such courses in any later semester on probation is suspended. Two grades *D* will be treated as equivalent to one grade of *F* in determining suspensio Any grades of *D* or *F* replacing earlier grades of *I* will be considered a part o the record for the semester during which the *I* is removed.

A student who is subject to probation for the third time, whether successive or after an interval, is suspended.

A student suspended for poor scholarship cannot register for courses even as an auditor. He may apply for readmission after the lapse of either the fa or the spring semester. He must then submit evidence to the Committee on Scholarship that he is better qualified to pursue college work. A student sus pended twice for poor scholarship will not be readmitted.

Graduate Suspension in the School of Education.—A student who receives the grade of *C* in more than 6 semester hours of work is subject to suspension A student who receives a grade of *F* must confer with the Dean of the School of Education before enrollment for further work.

Graduate Suspension in the School of Government and Business Administration.—A graduate student who does not meet the conditions of probation (see above) will be suspended or asked to withdraw. A student who is suspended or withdraws under these conditions may apply for readmission after the lapse of one academic semester. To be readmitted the student must submit evidence which indicates academic success if readmitted. A student so readmitted will continue on academic probation and must achieve a minimum quality-point index of 3.50 in the next 12 semester hours of graduate study. Should the student fail to achieve this minimum quality-point index a second suspension will result and subsequent readmission will be denied.

CHANGES IN PROGRAM OF STUDIES

DROPPING A COURSE OFF CAMPUS

A course may be dropped without academic penalty *during the first third of the semester.* Withdrawing from a course without academic penalty after the first third of the semester requires approval of a written request, *accompanied by a completed drop slip,* addressed to the Dean of the College of General Studies.

Procedure for Dropping Courses.—An off-campus drop slip (obtainable from the instructor, or University representatives at the College of General Studies) must be completed, signed and dated by the instructor, and submitted to the

* The rules governing probation and suspension are applicable as stated to students enrolled for a full-time program (12 semester hours or more) during the fall or spring semester. Students enrolled for less than 12 semester hours during the fall or spring semester and students enrolled during the summer sessions are subject to probation or suspension on the basis of their record for 12 semester hours, or multiples thereof, rather than on their record in any one semester.

College of General Studies. The instructor will indicate on the drop slip whether or not the student is passing. Merely reporting a withdrawal to an instructor does not effect the student's discontinuance from a course; a proper drop slip must be submitted to the College of General Studies. The effective date will be the date the instructor signed the drop slip.

Failure to follow the proper procedure will result in the Office of the Registrar recording the grade of *F* and, regardless of the time of discontinuance, will not relieve the student of financial responsibility for the entire course.

DROPPING A COURSE ON CAMPUS

A *campus* drop slip (available at the Office of the Registrar) must be completed, signed and dated by the instructor, and submitted to the Office of Student Records, College of General Studies.

Each college and school of the University sets deadline dates for each semester concerning withdrawal.

All charges for courses dropped without the approval of the dean must be met by the student. Reporting the dropping of a course to an instructor does not constitute an official withdrawal.

TRANSFER WITHIN THE UNIVERSITY

Transfer of residence to the College of General Studies, as a degree candidate, from another college, school, or division of the University may be made only with the approval of the deans concerned. Applications for transfer are available at the University's Office of Admissions or at the office of the appropriate dean. Upon transfer the student should consult his faculty adviser as to the requirements he must fulfill.

A maximum of 42 semester hours is transferrable toward the Associate in Arts in General Studies degree; a maximum of 90 semester hours is transferrable toward a Bachelor's degree; a maximum of 9 semester hours is transferrable toward a Master of Science in Administration degree; and a maximum of 9 semester hours is transferrable toward the degree of Master of Arts in Special Studies, Master of Science in Forensic Science, or Master of Science in Special Studies. Students transferring within the University are advised to complete the residence requirements of the degree sought.

CREDIT

Credit toward a degree is given only after registration for and satisfactory completion of the required work of courses in the University, or upon the granting of advanced standing in accordance with the regulations of the College.

For transfer from credit to audit status, see page 27.

BALANCE SHEET

Upon request, the Registrar will issue to undergraduate degree candidates a balance sheet showing the amount of work completed and the requirements remaining to be met for the degree. A second balance sheet will be issued only in the event the student changes major or degree objectives.

TRANSCRIPTS OF RECORD

Official transcripts of student records are issued on written request of the st dent or former student who has a clear financial record. A fee of $2 is charg for each transcript. When more than two transcripts are ordered at the sam time, a $2 fee is charged for each of the first two transcripts and a $.50 fe is charged for each additional transcript.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* de gree requirements are satisfied (for "Leave of Absence" exception granted by the Graduate School of Arts and Sciences, see pages 72–73). Students who have completed course registration (including the thesis) must maintain con tinuous registration by paying the "continuous registration" fee (see page 29). By failing to register for one semester or more, the student breaks his registra tion and must be readmitted (see "Readmission," page 26). A "Readmitted Student" is required to satisfy the curriculum requirements existing at the time of his readmission. The maintaining of continuous registration normally is limited to a period of one year.

Students must be registered during the summer if they are taking courses, are taking required examinations, are receiving guidance toward theses or disser tations, or are expecting to graduate at the end of the Summer Sessions.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to his dean of a copy of his orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, he must apply for readmission to the University well in advance of the semester in which he expects to return. Pay ments for tuition and fees which are not refunded to the student at the time he is granted military leave will be maintained as a deferred credit for his account and use upon return to the University.

GRADUATION REQUIREMENTS

To be recommended for graduation a student must have met the admission re quirements of his college or school; completed satisfactorily the scholarship, cur riculum, residence, and other requirements for the degree for which he is regis tered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session immediately preceding the awarding of the degree. A letter concerning degree completion is sent to military files upon request.

Application for Graduation.—An "Application for Graduation" form *must* be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the senior or final year. Students completing degree re quirements during the Summer Sessions will be awarded diplomas (no formal convocation) September 30, *provided* they have completed all degree require ments and have applied for graduation as a part of registration for the Summer Sessions.

Scholarship.—The student must meet the scholarship requirements for the particular degree for which he is registered.

Curriculum.—See the requirements for the degree concerned.

Residence.—A student is "in residence" only when registered for course work after filing formal application for degree candidacy or for the 15 semester hours undertaken to qualify for degree candidacy, (see the specific residence requirements for the degree concerned).

With the permission of the appropriate dean, a student may be granted leave of absence; such student should, however, remain technically in residence by paying the continuous registration fee for each semester he is absent (for exception granted by the Graduate School of Arts and Sciences, see pages 72-73). For the purpose of this regulation, the summer session is disregarded.

Except for Master's degree candidates in the Graduate School of Arts and Sciences, the School of Education, and the School of Engineering and Applied Science, service personnel who receive military transfers when they are within 6 hours of a degree may, by special arrangements, be permitted to complete their work elsewhere, transfer these credits to the appropriate school or college, and receive a degree from this University. This procedure does not apply to Master's candidates who have been granted 6 hours of transferred credit or have not completed the required courses.

Attendance and Conduct.—The University reserves the right to refuse to confer a degree upon a candidate whose attendance or conduct has been unsatisfactory.

Thesis.*—A thesis, submitted in partial satisfaction of requirements for the Master's degree, must be submitted in its final form to the appropriate dean no later than the date specified in the calendar. Two complete copies of each thesis are required. It is the responsibility of the candidate for a graduate degree to obtain from the College of General Studies a printed copy of the regulations governing the styling and reproduction of the thesis. These regulations are rigidly enforced (see page 75).

Accepted theses, with accompanying drawings, become the property of the University and are deposited in the University Library, where the duplicate copies are bound and made available for circulation.

Dissertation.—A dissertation, submitted in partial satisfaction of requirements for the Doctor of Science degree, must be submitted in its final form to the appropriate department of the School of Engineering and Applied Science no later than the date specified in the Calendar. It is the responsibility of the candidate to obtain a printed copy of the regulations governing the styling and reproduction of the dissertation (see page 88).

HONORS

Dean's List.—To be eligible for inclusion on the Dean's List, a student must be a candidate for an undergraduate degree in Columbian College of Arts and Sciences or the School of Government and Business Administration. Course work taken while the application for admission is being processed will be com-

*Applicable only to programs in the School of Government and Business Administration. See pages 68-69 for *Thesis* in the School of Engineering and Applied Sciences, pages 69-70 for *Thesis* in the School of Education.

puted in determining eligibility for the Dean's List. In the School of Gove ment and Business Administration, the names of students who achieve a q ity-point index of 3.50 or higher are placed on the Dean's Honor List for t semester. Appearance on the list will be limited to (1) full-time stude registered for a minimum of 12 semester hours and (2) part-time stude registered for a minimum of 12 semester hours over a period of two consec tive semesters, which may include a summer term. In Columbian College Arts and Sciences degree programs, a student must have received grades of in at least 60 per cent of the last 15 semester hours of work and no grad below *B* for that semester.

With Distinction.—The undergraduate degrees may be conferred "With Di tinction," at the discretion of the Dean's Council of the College and the Com mittee on Scholarship if a student meets the following qualifications: in th School of Government and Business Administration the student must attain quality-point index of 3.50 or higher on all work taken at this University o in Columbian College of Arts and Sciences programs the student must have received grades of *A* in at least 60 per cent of the courses taken at this Univer sity.

To be eligible for this honor a student must have completed at this Univer sity at least one-half of the course work required for the degree.

Special Honors.—Special Honors may be awarded to any member of the graduating class for outstanding achievement in the student's concentration o work on recommendation of the major department. The student must fulfi the following requirements:

1. The student must have candidacy for Special Honors approved by the faculty member representing the major department or concentration no later than the beginning of the senior year.

2. The student must meet such other conditions as may be set at the time candidacy is approved.

3. The student must have completed at this institution at least one-half of the courses required for the degree.

4. The student must fulfill the specific requirement of the college or school in which he is registered, as follows: (a) Columbian College of Arts and Sciences —attainment of the grades of *A* or *B* in 50 per cent of the courses taken at this institution; or (b) the School of Government and Business Administration— maintain a quality-point index of at least 3.00 on all course work taken at this institution.

Note: A student may receive the Associate in Arts degree "With Distinction" if the student has taken at this institution at least one-half of the courses re quired for the degree and has received the grade of *A* in at least 60 per cent of these courses. The student may receive the degree "With Special Honors" if at least one-half of the courses required for the degree have been taken at this institution and the grades of *A* or *B* have been received in 50 per cent of these courses.

DISHONESTY

The University community, in order to fulfill its purposes, must establish and maintain guidelines of academic behavior. Although all members of the com munity are expected to exhibit honesty and competence in their academic work

ncoming students have a special responsibility to acquaint themselves with, and make use of, all proper procedures for doing research, writing papers, and taking examinations.

Members of the community will be presumed to be familiar with the proper academic procedures and held responsible for applying them. Deliberate failure to act in accordance with such procedures will be considered academic dishonesty. Acts of academic dishonesty are a legal, moral, and intellectual offense against the community and will be prosecuted through the proper university channels.

Copies of the University policy on academic dishonesty can be obtained from the following offices: all department chairmen, all academic deans, and the Vice President for Academic Affairs.

THE LIBRARY

A student registered in the College of General Studies is entitled to the use of the University Library. Its stacks are open, and all students are welcome to browse at their leisure. A permit form for library privileges is issued to each student. A borrower's card may be obtained by presenting the permit form at the circulation desk of the Library.

The loan period for stack books is 14 days. A fine of 25 cents is charged for each day a book is overdue. Any book which circulates is subject to recall by the Library if needed for reserve or other use. Reserve books must be used in the reserve reading room when the Library is open, except that they may be withdrawn for overnight use beginning at 8:30 p.m. A fine of 50 cents is charged for each hour or fraction thereof that a reserve book is overdue. Grades of a student are withheld until his library record is clear.

All students using the University Library are expected to be familiar with its detailed regulations, available at any of the Library's service desks.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

RECENTLY ESTABLISHED REGULATIONS

The Appendix (pages 187–189) contains regulations recently approved by the University's Board of Trustees.

UNIVERSITY POLICY ON RELEASE OF STUDENT INFORMATION

The Family Educational Rights and Privacy Act of 1974 applies to institutional policies governing access to and release of student education records maintained by educational institutions which are recipients of federal funds. The University complies with this statute, which states, in part, that such institutions must:

1. Afford students access to education records directly related to them;
2. Offer students an opportunity for a hearing to challenge such records as inaccurate, misleading, or otherwise inappropriate;
3. Receive the student's written consent before releasing information from his or her education records to persons outside the University, except for directory information as indicated below. Personally identifiable information may be furnished to a student's parents without such written consent only upon certification of the student's financial dependency; and
4. Comply with judicial order or lawfully issued subpoena to release a student's record notifying this student of the action.

The University will release the following directory information upon request: address; telephone number; dates of attendance; school, college, or division of enrollment; field of study; credit hours earned; degrees earned; and honors received. A student who does not wish such directory information released must file written notice to this effect in the Office of the Registrar.

University guidelines on the release of student information may be obtained from the Office of the Registrar.

Student Services

HONOR SOCIETIES

Alpha Sigma Lambda.—A National honor society for part-time evening college and off-campus undergraduate degree students, the purpose of which is to recognize and to encourage scholarship and leadership among undergraduate degree candidates. Membership is limited to students who have been enrolled for four semesters or terms in the College of General Studies and have completed 30 semester hours of work toward a degree with a 3.50 average, or equivalent. The Alpha Alpha Chapter was established at George Washington University in 1965.

Phi Beta Kappa.—Undergraduate degree candidates in the College of General Studies programs are eligible for membership in Phi Beta Kappa, national scholarship honorary society. The society recognizes "outstanding intellectual capacity well employed" in the field of liberal arts and sciences. Senior and junior students who are candidates for the degree of Bachelor of Arts, Bachelor of Science, or Bachelor of General Studies in Columbian College, and who have shown broad cultural interests, distinguished scholarly achievement, high character, general promise, and scholarly ideals may, to a number not exceeding 10 per cent of a class, be elected to membership by the faculty members of the Alpha Chapter of the District of Columbia. Seniors and juniors in other schools of the University who meet the above requirements are also eligible for

consideration for membership, provided that their program of studies includes appreciable work in the liberal arts.

COUNSELING

Students in the off-campus programs may obtain educational counseling and assistance in program planning through the Office of Counseling and Information Services or from University representatives at the various off-campus centers. The Office of Counseling and Information Services coordinates student personnel services, including adult academic counseling, vocational guidance as related to educational programs, and liaison with other University departments and services, as well as serving as a resource center for information on tuition assistance available to students in the College of General Studies programs. Appointments may be made by calling the College of General Studies, telephone 676-7000, or through the Education Director at locations where courses are scheduled. University counselors are also available at all locations during announced registration periods and at scheduled times each month.

UNIVERSITY BOOKSTORE

Textbooks may be ordered by mail from the University Bookstore. Forms for this purpose are available at registration. The hours of the Bookstore will be announced in the *Schedule of Classes*.

The Bookstore is located in the Cloyd Heck Marvin Center, 800 21st Street, N.W.; telephone 676-6870.

VETERANS EDUCATION

The veterans counselor in the Office of the Registrar, Luther Rice Hall, 2121 Eye Street, N.W., assists students entitled to educational benefits as veterans, widows, or children of deceased or totally disabled veterans with any problems which may arise concerning their benefits. This Office also processes certification of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or dependents of veterans should consult with the veterans counselor prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 941 N. Capitol St., N.E., Washington, D.C. 20421.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

The Student and Alumni Career Services Office, Woodhull House, 2033 G Street, N.W., provides assistance to students and alumni seeking full-time, part-time, temporary, or permanent employment.

Counseling concerning trends in employment, areas of employment, various test and examination announcements, preparation for job interviews, resume-writing, and other procedures for successful job application are always avail-

able. Specific career openings; an on-campus recruitment program by business, industry, government, and school systems; volunteer opportunities; and part-time and temporary jobs for students while attending school are all part of this service. Teacher credential files initiated by persons seeking employment in all educational fields are maintained in this Office. Reference files for students applying to law schools, medical schools, or other graduate schools are maintained.

An understanding and knowledgeable approach to avenues of service for those people who do not find career satisfaction in the structured systems of business, government, and education is also provided in the Student and Alumni Career Services Office.

The Continuing Education for Women Center

MANY WOMEN wish to resume or continue their education on a part-time basis. They feel the need to return to the classroom to update their education, prepare for new careers, qualify for job promotion, participate more effectively in community affairs, or enrich their own lives through a sense of personal growth. The Continuing Education for Women program, which originated in 1964, is designed to meet these needs. More than 7,000 women have been assisted with their goals during a 13-year period. The Continuing Education for Women program was originated for women. However, men are encouraged to enroll in credit and noncredit courses, workshops and counseling services. For further information telephone 676-7036 or write to the Continuing Education for Women Center, George Washington University, 2130 H Street, N.W., Washington, D.C. 20052. Descriptive brochures are available.

Continuing Education for Women offers (1) group and individual counseling services (day and evening); (2) off-campus credit courses at convenient hours and locations; (3) seminars and noncredit courses; (4) academic advising for those entering degree and nondegree programs; (5) a Legal Assistant Program; (6) a Landscape Architect Assistant Program; (7) a Publications Specialist Program; and (8) specially designed courses and workshops for business and government agencies.

COUNSELING SERVICES

New Horizons/Career Development-Life Planning helps participants to gain confidence and direction by increasing their awareness of personal strengths and limitations. They acquire self-understanding through introspective and experiential exercises and standardized tests; set priorities; learn effective job-finding skills; assess career outlook; examine educational opportunities; explore appropriate career and personal options.

Career Planning for Young Women is designed to meet the special needs of students in their last two years of high school or first two years of college. They are offered assistance in exploring career opportunities, choosing an appropriate curriculum, developing effective study skills, learning job-finding techniques and setting immediate and future goals.

Developing New Horizons for International Women offers women from other countries an opportunity to understand themselves, to become culturally

oriented to the U.S., and to discuss ways of developing and utilizing their talents.

Single Again helps formerly married persons to make emotional and social adjustments and gain legal and financial information.

Single Parenting gives special assistance to both the fully responsible and the absent parent, in coping with feelings and difficulties.

Creative Retirement assists in planning for another full-time career, part-time employment, volunteer activities or leisure interests.

Dynamic Aging explores the aging process from a personal perspective; psychological, physical and social aspects will be considered.

The Multi-generational Family addresses the problems which arise when grandparents, parents and children live in one household and emphasizes ways of recognizing the rights and responsibilities of each.

Individual Counseling includes a battery of tests, independent study and interviews. Counseling is on a one-to-one basis. This program is by appointment only.

Groups are scheduled for day and evening hours on weekdays and Saturdays in selected locations in D.C., Maryland and Virginia. For information on counseling services, call 676-7036.

DAY-TIME OFF-CAMPUS CREDIT COURSES

To enable women to continue their formal education the Continuing Education for Women Center offers credit courses off campus at hours and locations convenient for women. Classroom space has been provided by churches and community centers in Alexandria, Arlington, Annandale, Falls Church, McLean, and Springfield, Va.; Bethesda, Chevy Chase, Kensington, and Rockville, Md.; as well as the District of Columbia.

Except for Education courses, which meet for 3 hours a week, each undergraduate course meets once a week for 2½ hours during the morning, early afternoon or evening. Although many women take these courses to meet requirements for degree programs, students may also be accepted in a nondegree status. Many women who complete credit courses as nondegree students are encouraged to apply for degree candidacy at George Washington University. Other women need only specific courses to qualify for positions in business or government; some who already have degrees wish to qualify for professional certification. Many students in this program have had credits transferred to other colleges and universities throughout the country.

Increasingly, government and industry have been granting leave for employed women to enroll in daytime credit courses, particularly where the courses are job-related.

Since 1965 more than 100 selected undergraduate and graduate credit courses from 21 departments have been offered by the Continuing Education for Women Center.

NONCREDIT COURSES

Selected noncredit courses and seminars, taught by academically qualified instructors, are offered through the Continuing Education for Women Center. Offerings include *Introduction to Library Science; Writing and Illustrating Children's Books; Creative Thinking and Problem-solving; Starting Your Own*

Business; How to Study; Mathematics Refresher; Write To Sell; Conference Planning; CLEP Review; Introduction to Landscape Architecture; Current Mental Health Practices; Writing Fiction; Masters of American Art; Law School Admission Test Review; Assertive Communication; Write Nonfiction and Biography; Nutrition and Mental Health; Time Management; Money Management and Portfolio Building; How to Get More Grants; 20th Century Artists and Their Techniques; Be an Effective Manager/Leader; Poetry Workshops.

Career Certificate Programs

LEGAL ASSISTANT PROGRAM

During the fall of 1972, the Continuing Education for Women Center, in cooperation with the George Washington University National Law Center, initiated the Legal Assistant Program. This one-year graduate-level academic program prepares men and women to assist lawyers in research, writing, and other out-of-court functions. For admission to the Program, an applicant must have a bachelor's degree or the equivalent in education or experience and must successfully complete required tests. For a special brochure giving details of this Program, telephone 676-7036.

LANDSCAPE ARCHITECT ASSISTANT PROGRAM

A 12-month certificate program in landscape and environmental design was initiated during the spring of 1974. This Program concentrates on drafting and design, and includes a survey of plant materials as well as lectures on the various aspects of the professional's work. Projects in residential, recreational, and urban design are studied along with construction details and graphic rendering of plans. A Certificate will be awarded upon the satisfactory completion of the Program. Classes are open to both men and women and are taught by professional landscape architects and horticulturists. A college degree is desirable but not required. However, for admission to the program an applicant must complete required tests. For further information and a brochure, telephone 676-7036.

PUBLICATION SPECIALIST PROGRAM

A graduate-level, certificate program in editorial and publishing procedures began in January 1974. The program provides men and women with the practical skills needed for careers in the publications field. It takes one year to complete. A Certificate will be awarded upon the satisfactory completion of the Program. The main areas of study are (1) editing and copywriting; (2) printing, layout, and design; and (3) public affairs information. For admission to the program, an applicant must have a bachelor's degree. For information and a brochure, telephone 676-7036.

ACADEMIC ADVISING

The professional staff of the Continuing Education for Women Center advises women interested in enrolling in off-campus degree and nondegree programs

Counselors are available at dates and locations indicated for registration. Appointments can also be made for periodic advising sessions at the Office of Continuing Education for Women Center, 2130 H Street, N.W., Washington, D.C. 20052. For information telephone 676-7036.

WORKSHOPS—GOVERNMENT AND BUSINESS

Twelve years of experience in creating and conducting successful programs to meet the needs of women enables the staff of the Continuing Education for Women Center to provide expertise in designing programs to improve employee competence and aid in upward mobility with on-site workshops and courses.



DEGREE PROGRAMS

Undergraduate Degrees

THE FACULTY of Columbian College of Arts and Sciences has academic ju isdiction over the degrees of Associate in Arts in General Studies; Bachelor General Studies with areas of concentration in Economics, History, Law E forcement, Mathematics, Political Science, Psychology, and Sociology; Bache of Science in Geodetic and Cartographic Science; and Bachelor of Science Oceanography. The Faculty of the School of Government and Business Ad ministration has academic jurisdiction over the degree of Bachelor of Scienc in Administration with areas of concentration in Accounting and Busines Administration. These off-campus programs are administered by the Colleg of General Studies.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 17, an "Undergraduate Degree Candidacy," page 23.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized W drawal) may be assigned are described on page 32.

Removing an Incomplete.—In Columbian College of Arts and Sciences the School of Government and Business Administration the grade of *I* must removed no later than the last day of the examination period for the fa spring semester immediately following the semester or summer session in wh the grade of *I* is assigned. An "Incomplete" that is not removed within this riod is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the appropriat dean, or the appropriate committee, for additional time in which to comple the work of the course. Such petitions should be submitted within the s period. The grade of *I* cannot be removed by reregistering for the course he or by taking its equivalent elsewhere.

REQUIREMENTS FOR THE ASSOCIATE IN ARTS IN GENERAL STUDIES DEGREE

RESIDENCE

The last 18 semester hours in the Associate in Arts in General Studies degree program must be completed in residence as a candidate for this degree. A portion of the academic work taken to qualify for degree candidacy (see page 17) may be accepted in partial satisfaction of the residence requirement, if the courses are approved as part of the student's degree program.

REQUIREMENTS FOR THE BACHELOR'S DEGREES

RESIDENCE

The last 30 semester hours, including at least 12 hours in the area of concentration, must be completed in residence as a candidate for the degree sought, unless special permission is granted by the appropriate dean to take work elsewhere. This requirement applies to students transferring within the University as well as to students transferring from other institutions. The 15 hours taken in order to be considered for degree candidacy may be counted in residence. For regulations governing military students who are transferred when they are within 6 semester hours of their degrees, see page 41.

Transfer students to the School of Government and Business Administration who have 90 semester hours of approved transfer credits from another college or university and who need only the 30-semester-hour minimum to complete degree requirements *must* plan their program of study with a faculty adviser before registering for the first course.

In no case will credit for more than 15 semester hours of undergraduate course work taken as a nonmatriculated student at this University be allowed toward meeting degree requirements without prior admission as a degree candidate for the Bachelor of Science in Administration program.

Transfers.—Transfer students from other colleges or universities must complete satisfactorily at least 12 semester hours of the required work in their area of concentration in residence as a candidate for the degree sought.

ASSOCIATE IN ARTS IN GENERAL STUDIES

Faculty Adviser: John H. McCalla, College of General Studies; Building F, Room 14, Telephone 676-7016.

Upon the satisfactory completion of the requirements set by Columbian College of Arts and Sciences, the degree of Associate in Arts in General Studies is conferred. Students who plan to continue working toward an off-campus Bachelor's degree offered by Columbian College must apply to the Dean upon completion of the requirements for the degree of Associate in Arts in General Studies. Forms for this purpose are available at the College of General Studies.

After completing the requirements for the degree of Associate in Arts in General Studies, students may wish to transfer to an on-campus degree program within the University, or they may wish to transfer to another institu-

tion. However, modifications in admission, advanced standing, and curricul requirements permitted in the Associate in Arts in General Studies deg program may not be accepted in transfer. Therefore, while registered for t degree, students should meet the requirements of the college, school, or u versity to which they wish to transfer. The entrance requirements of the c leges and schools of the University are stated in this catalogue and in t *Undergraduate and Graduate Catalogue* of the University.

Scholarship.—The system of grading is described on page 35. For reg lations concerning probation, suspension, and readmission, see pages 37–38.

CURRICULUM

The satisfactory completion of 60 semester hours of college work in the fo lowing curriculum is required. Students who plan to pursue a Bachelor's de gree are advised to plan their Associate's program so that they will satisfy th prerequisites to the degree of their choice.

	Semester Hours
Communications	
Engl 9 or 10, 11	6
SPDR 1, 11, 111, or 121	3
Humanities	
Nine semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72; Mus 3, 4; Phil 50; Rel 9, 10, 59–60	9
Natural and Mathematical Sciences	
Nine semester hours selected from the following: BiSc 3–4, 11–12; Chem 3–4, 5–6; Geol 1–2, 3, 4; Math 3, 6, 9, 10, 30, 31, 51, 52; Ocea 103–4; Phys 1, 2, 3, 4, 9–10; Stat 51, 101–2	9
Social Studies	
Nine semester hours are required, each course chosen from one of two departments, selected from the following: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40, 71–72; PSc 4 or 5, 6; Psyc 1, 8, 22, 29; Soc 1, 2	9
Elective	24
Total	60

BACHELOR OF GENERAL STUDIES

Faculty Adviser: John H. McCalla, College of General Studies; Building F, Roo 14, Telephone 676-7016.

The Bachelor of General Studies curriculum aims to provide the adult part-tim student with the opportunity to obtain a broad education. For that reason th course work required in the first and second years is distributed among Co munications (written and oral), the Humanities, Natural and Mathematical Sc ences, and the Social Studies. In choosing the third- and fourth-year cours work required in departments related to their concentration, students shou obtain counseling through the faculty adviser.

Students planning to work toward Master's degrees are advised to plan their Bachelor's programs so that they will meet the prerequisite requirements of the school or college of their choice. Students planning to enter graduate programs which require a reading knowledge of a foreign language are advised to include two years of one foreign language in their Bachelor's program.

Scholarship.—To qualify for graduation 120 hours of course work must be passed and an index achieved of 2.00 based on courses passed with grades of *A*, *B*, *C*, or *D*. The index is obtained by dividing the number of quality points by the number of semester hours of courses the student submits for graduation with grades of *A*, *B*, *C*, or *D*, both based on his record at this University. The index is computed from grades as follows: *A*, four points; *B*, three points; *C*, two points; *D*, one point, for each semester hour for which the student has registered. Courses marked *F*, *W*, *I*, *NC*, or *CR* are not considered in determining the index. (When a formal grade is recorded for an Incomplete, a grade of *D* or better will be included in the computation of the index.) Grades in courses taken at another institution are not considered in computing the index.

Students must also achieve no lower than the grade of *C* in the minimum number of 100 level (or above) courses required in the selected area of concentration. *D* in a required course will satisfy a curricular requirement in the area of concentration and may count toward the total 120 hours, but it shall *not* count toward the minimum number of hours required in the area of concentration.

The system of grading is described on page 35. For regulations concerning probation, suspension, and readmission, see pages 37–38.

First and Second Years

COMMUNICATIONS	Semester Hours
Engl 9 or 10, 11	6
Engl 20	3
SPDR 1, 11, 111, or 121	3
HUMANITIES*	
Twelve semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72; Foreign Language (2 years of one language); Mus 3 and 4; Phil 50; Rel 9 and 10, 59–60; Slav 91–92	12
NATURAL AND MATHEMATICAL SCIENCES	
Six to eight semester hours selected from the following: BiSc 3–4, 11–12; Chem 3–4, 5–6; Geol 1–2, or 3 and 4; Ocea 103–4; Phys 1 and 2, or 3 and 4 or 9–10	6–8
Six semester hours selected from the following: Math 3, 6, 9, 10, 30, 31, 51, 52; Stat 51, 53, 101–2	6

* Students who plan to continue study for advanced degrees are urged to fulfill the 2-year language requirement.

SOCIAL STUDIES

Twelve semester hours selected from two of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; PSc 4 and 6; PSc 5 and 6; Psyc 1 and 8; Psyc 1 and 22; Psyc 1 and 29; Soc 1 and 2 .....

Elective (depending on science option) .....

Third and Fourth Years

Concentrations are offered in Economics, History, Mathematics, Political Science, Psychology, and Sociology.

CONCENTRATION REQUIREMENTS (to be selected in consultation with the faculty advisor):

100-level courses in the department of the selected area of concentration....
100-level courses in two or more related departments.....

ELECTIVE .....

TOTAL .....

BACHELOR OF GENERAL STUDIES—AREA OF CONCENTRATION IN LAW ENFORCEMENT

Faculty Adviser: Earl H. Williams, Assistant Professorial Lecturer in Forensic Sciences, R-15, Telephone 676-7124.

The Bachelor of General Studies Degree with a concentration in Law Enforcement is designed for students now working as police officers or interested in future careers in law enforcement. The curriculum will provide a broad academic base in the arts and sciences, as well as the maximum professional competency to function effectively in investigative and regulatory agencies at the municipal, county, state, and federal levels. The scholarship requirements and system of grading is the same as for the other areas of concentration. See pages 35, 37–38 and 54.

First and Second Years

ENGLISH

Engl 9 or 10, and, 11 or 12 .....

HUMANITIES

Six semester hours selected from the following:
Art 31–32, 71–72; Engl 43-44, 45–46, 51–52, 71–72; Foreign Language (beyond the first four semesters); Mus 3–4; Rel 9–10, 59–60 .....

* Students selecting Psychology or Sociology as an area of concentration are required to take semester hours of 100-level Psychology courses (for the Psychology area of concentration) or Soc ology courses (for the Sociology area of concentration) and 24 semester hours of 100-level courses in two or more related departments.

NATURAL AND MATHEMATICAL SCIENCES	Semester Hours
Six to eight semester hours selected from the following: BiSc 3–4, 11–12; Chem 3–4, 11–12, 15–16; Geol 1–2; Phys 1–2	6–8
Six semester hours selected from the following Mathematics combinations: 9 and 10, 9 and 104, 31 and 32, 51 and 52, 103 and 104; Stat 51 or 53 or 101 in combination with 97 or 102 or 105	6
PREREQUISITES	
PSc 6; Psyc 1 and 8; Soc 1	12
STRONGLY RECOMMENDED	
Foreign Language: First-group courses	
ELECTIVES	22–24
	60

Third and Fourth Years

REQUIRED COURSE WORK		
LEnf 121:	Survey of Forensic Science I	3
LEnf 122:	Survey of Forensic Science II	3
LEnf 142:	Criminal Law and Procedure	3
*LEnf 180:	Law of Arrest, Search and Seizure	3
PSc 122:	U.S. Constitutional Law and Politics	3
Psyc 101:	Abnormal Psychology	3
Soc 129:	Race and Minority Groups	3
*Soc 135:	Juvenile Delinquency	3
Soc 136:	Criminology	3
Soc 139:	Society and the Deviant	3
		30

ELECTIVES

Thirty hours of electives are to be chosen in consultation with the Faculty Adviser. Nine semester hours must be elected in law enforcement courses; remaining electives may be chosen from the current *Undergraduate and Graduate Catalogue*. Catalogue courses numbered below 100 are more suitable for the first and second years. The following electives are in or are closely related to the field of Law Enforcement.

BAd 102: Fundamentals of Management
BAd 105: Personnel Management
BAd 106: Leadership in Personnel Management
†LEnf 123: Criminal Investigation
LEnf 131: Police Investigation and Administration II
LEnf 141: Criminal Evidence for Police
LEnf 151: Criminal Law in the District of Columbia

*See course descriptions in this catalogue for prerequisite courses
†Strongly recommended

LEnf 152:	Criminal Law in Maryland
LEnf 153:	Criminal Law in Virginia
LEnf 160:	Presentation of Testimony
LEnf 161:	Environmental Law
LEnf 162:	White Collar Crime
LEnf 163:	Police and Community Relations
LEnf 164:	Evidence Photography
LEnf 165:	Organized Crime
*Phar 115:	Drug Abuse Education
PSc 103:	State Politics
*PSc 104:	Urban Politics
Psyc 112:	Psychology of Adolescence
Psyc 144:	Personal and Industrial Psychology
Psyc 156:	Psychology of Attitudes and Public Opinions

BACHELOR OF SCIENCE IN ADMINISTRATION

Academic Advising: Information and Advising Center, Government 201B. Telepho 676-7027.

The Bachelor of Science in Administration curriculum aims to provide th adult part-time student with the opportunity to obtain a broad education preparation for careers in accounting or business administration. Studen should obtain both general educational counseling and specific area of concen tration advising when initially considering their curriculum. A conference con cerning curriculum planning for courses to be taken as a degree candidate is *required* of each applicant *before* admission to degree candidacy. The course work required in the first and second years is a general curriculum for both the Accounting and Business Administration concentration. The course work required for the third and fourth years is chosen from either the Accounting or Business Administration area of concentration curriculum. In choosing the third- and fourth-year course work required in departments related to their concentration, students should obtain counseling through the appropriate de partmental faculty adviser. Except for Acct 115, 121, and 191, no student may receive credit for courses in Accounting and Business Administration numbered *above the 100-level* unless third-year (junior) standing has been attained. Also, an exception is made for those 100-level courses (BAd 102, 105, and Mgt 118) specifically approved by the School of Government and Business Administration which are taken in the program of study leading to the degree of Associate in Arts in General Studies. Students who elect BAd 102, 105, and Mgt 118 while enrolled in the Associate in Arts in General Studies degree pro gram will receive *elective* credit for these courses if they transfer to the Bache lor of Science in Administration degree program as juniors. However, an addi tional course in each of the three areas covered by these courses must be taken to fulfill the core requirements of the degree of Bachelor of Science in Administration. The course work for all four years is described on the following pages.

Students are reminded that Accounting and Business Administration courses taken at accredited 2-year colleges may be applied toward the degree of Bache lor of Science in Administration provided they are comparable to below 100-level courses required in the first and second years of the curriculum.

* Strongly recommended.

Students planning to work toward Master's degrees are advised to plan their Bachelor's programs so that they will meet the entrance requirements of the school or college of their choice.

CREDIT/NO CREDIT OPTION

A junior or senior student who has a cumulative quality-point index of 2.50 or better may, with the approval of the adviser and the Dean, take one course a semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which will be recorded on the student's transcript but will not be reflected in the quality-point index. No student will be allowed to take more than four credit/no credit courses. A student must sign up for such an option at registration. Under no circumstances may a student change from a credit/no credit status to graded status or vice versa after the end of registration. Courses required in the student's major field may not be taken on the credit/no credit basis. A transfer student may not choose this option until the second semester of enrollment in this University.

USE OF CORRECT ENGLISH

Any student whose written or spoken English in any course is unsatisfactory may be reported by the instructor to the Dean. The Dean may assign supplementary work, without academic credit, varying in amount with the needs of the student. If the work prescribed is the equivalent to a course, the regular tuition fee is charged. The granting of a degree may be delayed for failure to make up such deficiency in English to the satisfaction of the Dean.

SCHOLARSHIP

The system of grading and computing scholarship is described in detail on page 35. For regulations concerning probation, suspension, readmission, see pages 37–38.

To graduate a student must have the following: (1) a cumulative quality-point index of at least 2.00 and (2) a cumulative quality-point index in the area of concentration of at least 2.00. All courses taken at this University in the Bachelor of Science in Administration degree program (both required and elective courses) are to be included in the cumulative quality-point index calculation. Required 100-level courses (not including electives) are used in the calculation of the area of concentration cumulative quality-point index.

Accounting and Business Administration Curriculum

First Year

ACCOUNTING	Semester Hours
Acct 1–2	6
ENGLISH COMPOSITION	
Engl 9 or 10, 11	6

SCIENCE

Six to eight semester hours selected in consultation with the adviser from the following: BiSc 3–4; Chem 5–6; Geog 51 and 52; Geol 1–2, or 3 and 4; Phys 1 and 2, or 3 and 4, or 9–10 .....

SOCIAL STUDIES

Econ 1–2 .....

ELECTIVE (to be selected in consultation with the advisor from courses other than in Accounting, Business Administration, and Economics .....

Second Year

BUSINESS ADMINISTRATION

BAd 51 .....

ART, LITERATURE, LANGUAGE, MUSIC, AND PHILOSOPHY*

Six semester hours selected in consultation with the adviser from the following: Art 31–32; Engl 43–44, 45–46, 51–52, 71–72; Foreign Language (1 full year of a foreign language); Mus 3; Phil 50; Rel 9 and 10, or 21 and 22, or 59–60 .....

MATHEMATICS

† Math 31 and 32, or 51 and 52.....

SOCIAL STUDIES

Psyc 1, 8 .....
Six semester hours selected in consultation with the adviser from the following: AmCv 71–72; Anth 1–2; Hist 71–72; PSc 4 or 5, 6; Soc 1 .....

STATISTICS

Stat 51 or 101 .....

Accounting Concentration Curriculum

Third Year

Acct 101: Cost and Budgetary Control .....
‡Acct 121: Intermediate Accounting .....
Acct 161: Federal Income Taxation .....
‡Acct 191: Advanced Accounting .....

* Students selecting Accounting as an area of concentration may postpone this 6-hour requirement until the third year if they wish to elect Acct 121 and 191 in the second year.

† Math 31 and 32 are recommended for those students who plan to take graduate work in quantitative methods.

‡ If Acct 121 and 191 are elected in the sophomore year, students replace this requirement with 6 semester hours of humanities (see above).

		Semester Hours
BAd 102:	Fundamentals of Management	3
BAd 131:	Business Finance	3
BAd 141:	Basic Marketing Management	3
BAd 161:	Commercial Law	3
Mgt 118:	Introduction to Information Processing	3
Elective:	(Selected from courses other than in accounting, business administration, or economics, with the approval of the adviser)	3
		30

Fourth Year

Acct 132:	Accounting Theory	3
Acct 171:	Auditing	3
Acct 181:	Accounting Systems	3
BAd 101:	The Business Environment	3
BAd 181:	Manufacturing Production	3
BAd 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Stat:	Three semester hours selected in consultation with the adviser from the following	3
Stat 111:	Business and Economic Statistics I	
Stat 155:	Introduction to Probability	
Stat 187:	Theory of Sampling	
Elective:	(Three semester hours selected from 100-level courses in accounting, business administration, or economics with the adviser's approval)	3
Elective:	(Three semester hours selected from courses in other departments with the adviser's approval)	3
	Total semester hours	120

Business Administration Concentration Curriculum

Third Year

Acct 193:	Business Budgeting	3
BAd 102:	Fundamentals of Management	3
BAd 105:	Personnel Management	3
BAd 131:	Business Finance	3
BAd 141:	Basic Marketing Management	3
Mgt 118:	Introduction to Information Processing	3
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	6
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses)	6
		30

Fourth Year

BAd 101:	The Business Environment	3
BAd 161:	Commercial Law	3

		Semester Hours
BAd 181:	Manufacturing Production	3
BAd 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Psyc 144:	Personnel and Industrial Psychology	3
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	6
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses)	6
	Total semester hours	120



BACHELOR OF SCIENCE IN GEODETIC AND CARTOGRAPHIC SCIENCE

Faculty Adviser: Hyman Orlin, Professorial Lecturer in Geodesy, Cartography, and Oceanography; Telephone 946-3557. Counseling by appointment only, Telephone 676-7013.

The course work in this four-year curriculum is offered both on and off campus. However, the Cartography, Geodesy, and Oceanography courses are given only at selected off-campus locations. Following is a listing of these off-campus locations, the distance from campus, and method of available transportation. Students attending these classes are expected to make their own arrangements for transportation. (Many students arrange private transportation on the first night of class.)

Facility	Distance in miles	Method of Transportation
NOAA-Gramax Building, 8060 13th Street, Silver Spring, Md.	9	Public
NOAA-Page Building, 3100 Whitehaven Parkway, N.W., Washington, D.C.	2	Public
NOAA-NBOC-2, 5640 Wall Lane, Rockville, Md., telephone 443-8481 for room assignments (Wisconsin Ave., Rt. 240)	14	Public
NOAA-Hydrographic Office, Federal Office Bldg. No. 4, Suitland, Md.	12	Private
NOAA-TOPO Command, 6101 MacArthur Blvd., N.W., Washington, D.C.	7	Public
U.S. Geological Survey, Reston, Va.	20	Private
St. Luke's Episcopal Church, Old Georgetown Road and Grosvenor Lane, Bethesda, Md.	20	Private

Entrance requirements are stated on pages 17–20; residence requirements are ted on page 51.

HOLARSHIP

e system of grading is described on page 35. For regulations regarding bation, suspension, and readmission, see pages 37–38.

o qualify for graduation 120 hours of course work must be passed and an ex achieved of 2.00 based on courses passed with grades of *A*, *B*, *C*, or *D*. dents must achieve no lower than a grade of *C* in the minimum number of level or above courses required in the selected area of concentration.

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Required—First Year		Semester Hours
Engl 10:	English Composition: Language as Communication	3
Engl 11:	English Composition: Language and the Arts and Sciences	3
Geol 1 or 3:	Introductory Geology for Nonscience Majors	3
Math 30:	Precalculus	3

Math 31:	Calculus of One Variable
Phys 1 or 3:	Foundations of Physics
Social Studies:	To be selected from courses offered by the departments of American civilization, anthropology, economics, geography and regional science, history, journalism, political science, psychology, and sociology
Humanities:	To be selected from courses offered by the departments of art, east asian languages and literatures, English, Germanic languages and literatures, music, philosophy, religion, romance languages and literatures, Slavic languages and literatures, and speech and drama

Required—Second Year

Cart 1:	Cartography I
Cart 2:	Cartography II
Chem 11–12:	General Chemistry
Geod 12:	Plane Surveying
Geod 13:	Geodetic Surveying
Math 32:	Calculus of Several Variables
Math 33:	Calculus of Vector Functions
Stat 91:	Principles of Statistical Methods
or Stat 107:	Statistics for Engineers

Required—Third and Fourth Years

Geod 17:	Elementary Photogrammetry
Geod 18:	Intermediate Photogrammetry
Ocea 101:	Oceanography for Science Majors I
Ocea 102:	Oceanography for Science Majors II
Ocea 105:	Elementary Geophysics

COURSES REQUIRED IN THE CARTOGRAPHIC MAJOR

Cart 103:	Introduction to Remote Sensing
Cart 104:	Photo-interpretation
Cart 107:	Physiography
Cart 108:	Climatology
Cart 111:	Cartographic Techniques
Cart 112:	Advanced Cartography
Cart 120:	Computer Mapping
Cart 130:	Techniques in Remote Sensing
Geod 110:	Map Projections
Electives:	(Must be selected in consultation with the adviser)

COURSES REQUIRED IN THE GEODETIC MAJOR*

Cart 107:	Physiography
Geod 110:	Map Projections

* Students considering graduate studies should acquire a reading knowledge of either French, German, or Russian.

		Semester Hours
Geod 117:	Advanced Photogrammetry	3
Geod 155:	Elementary Geodesy	3
Geod 156:	Geodetic Astronomy	3
Geod 160:	Adjustment Computations I	3
Geod 161:	Adjustment Computations II	3
Electives:	(Must be selected in consultation with the adviser)	24–25
		120

BACHELOR OF SCIENCE IN OCEANOGRAPHY•

Faculty Adviser: Hyman Orlin, Professorial Lecturer in Geodesy, Cartography, and Oceanography; Telephone 946-3557. Counseling by appointment only, Telephone 676-7013.

The course work in this four-year curriculum is offered both on and off campus. However, the cartography, geodesy, and oceanography courses are given only at selected off-campus locations. Following is a listing of these off-campus locations, the distance from campus, and method of available transportation. Students attending these classes are expected to make their own arrangements for transportation. (Many students arrange private transportation on the first night of class.)

Facility	Distance in miles	Method of Transportation
NOAA-Gramax Building, 8060 13th Street, Silver Spring, Md.	9	Public
NOAA-Page Building, 3100 Whitehaven Parkway, N.W., Washington, D.C.	2	Public
NOAA-NBOC-2, 5640 Wall Lane, Rockville, Md., telephone 443-8481 for room assignments (Wisconsin Ave., Rt. 240)	14	Public
DMA-Hydrographic Office, Federal Office Bldg. No. 4, Suitland, Md.	12	Private
DMA-TOPO Command, 6101 MacArthur Blvd., N.W., Washington, D.C.	7	Public
U.S. Geological Survey, Reston, Va.	20	Private
St. Luke's Episcopal Church, Old Georgetown Road and Grosvenor Lane, Bethesda, Md.	20	Private

Entrance requirements are stated on pages 17–20; residence requirements are stated on page 51.

SCHOLARSHIP

The system of grading is described on page 35. For regulations concerning probation, suspension, and readmission, see pages 37–38.

To qualify for graduation 120 hours of course work must be passed and an index achieved of 2.00 based on courses passed with grades of *A*, *B*, *C*, or *D*.

• Students considering graduate studies should acquire a reading knowledge of either French, German, or Russian

Students must achieve no lower than a grade of *C* in the minimum number of 100-level or above courses required in Oceanography.

Curriculum

Required—First Year

Engl 10:	English Composition: Language as Communication
Engl 11:	English Composition: Language and the Arts and Sciences
Geol 1 or 3:	Introductory Geology for Nonscience Majors
Geol 2 or 4:	Introductory Geology for Nonscience Majors
Math 30:	Precalculus
Math 31:	Calculus of One Variable
Phys 1 or 3:	Foundations of Physics
Social Studies:	To be selected from courses offered by the departments of American civilization, anthropology, economics, geography and regional science, history, journalism, political science, psychology, and sociology

Required—Second Year

BiSc 11–12:	Introduction to Biology for Science Majors
Cart 1:	Cartography I
or Ocea 11:	Navigation
Math 32:	Calculus of Several Variables
Math 33:	Calculus of Vector Functions
Ocea 101:	Oceanography for Science Majors I
Ocea 102:	Oceanography for Science Majors II
Ocea 110:	Physical Oceanography
Humanities:	To be selected from courses offered by the departments of art, east Asian languages and literatures, English, Germanic languages and literatures, music, philosophy, religion, romance languages and literatures, Slavic languages and literatures, and speech and drama

Required—Third and Fourth Years

Cart 107:	Physiography
Cart 108:	Climatology
Chem 11–12:	General Chemistry
Ocea 105:	Elementary Geophysics
Ocea 111:	Ocean Waves and Tides
Ocea 112:	Biological Oceanography
Ocea 113:	Marine Geophysics
Ocea 114:	Chemical Oceanography
Ocea 115:	Geological Oceanography
Ocea 120:	Coastal Ecology
Stat 91:	Principles of Statistical Methods
or Stat 107:	Statistics for Engineers
Electives:	(Must be selected in consultation with the adviser)

SPECIAL DEGREE PROGRAMS

Servicemen's Opportunity College (SOC)

George Washington University has been designated a Servicemen's Opportunity College (SOC). SOC provides opportunities for active duty servicemen and women to pursue educational program goals through courses offered on base, in the evenings, on weekends, and at other nontraditional time frames. In support of the concept, George Washington University, while still maintaining its normal academic standards, assumes the responsibilities of meeting the educational needs of an individual serving in the Armed Forces. Provisions have been established whereby these individual needs can be met. Specifically, individuals who apply for admission as a degree candidate for either the Associate's or Bachelor's degree from George Washington University's Columbian College of Arts and Sciences may, at their request, be designated as SOC students. Such students will be assured of a degree completion program through use of the agreement that follows:

AGREEMENT

George Washington University, a Servicemen's Opportunity College, agrees to the following:

I. Upon admission to Associate in Arts in General Studies or Bachelor of General Studies degree candidacy, the student may take the required course work either on or off campus. Regardless of where taken, courses of study taken while a degree candidate may be applied toward the degree sought, as a requirement or an approved elective. Although the grade of *D* is not acceptable for transfer, it may be used to satisfy a curriculum requirement. It may not, however, be counted toward the total number of semester hours required for the degree, and it should not be repeated. Courses will be taken from George Washington University unless the serviceman is transferred to a location not served by this University. In the case of transfer and in consideration of the student's future assignment, arrangements will be made between the student and the counselor assigned to him by the College of General Studies to ensure that the courses he takes elsewhere satisfy his George Washington University program.

II. Academic credit may be obtained by any one or a combination of the following:

A. Registration as an on- or off-campus, full- or part-time student at this University.

B. Advanced standing for academic studies taken at other accredited institutions where such studies meet the requirements for the degree, or by examination. (A maximum of 42 semester hours allowed for the Associate's degree; a maximum of 90 semester hours allowed for the Bachelor's degree.)

Within the maximum of 42 hours of credit allowed for advanced standing toward the Associate in Arts in General Studies degree, a maximum of 30 hours may be obtained by any one or combination of the methods below. Within the maximum of 90 hours of credit allowed for advanced standing toward the

Bachelor of General Studies degree, a maximum of 60 hours may be obtain by any one or combination of the methods below.

1. *College-Level Examination Program (CLEP) Subject Examinations.*— CLEP Subject Examinations are offered in more than 20 subject areas. The tests measure achievement in the equivalent of specific college-level course (Credit may not be earned by passing the examination after having taken th equivalent course.) Maximum credit allowed for Associate's degree, 30 seme ter hours; maximum allowed for Bachelor's degree, 60 semester hours. A can didate for a degree from any school at this University must seek departmenta approval *prior* to taking the examination in order to receive credit for a CLE Subject Examination.

2. *College-Level Examination (CLEP) General Examination.*—CLEP Gen eral Examinations are offered in five areas: Mathematics; Social Sciences; Hu manities; Natural Sciences; and English Composition. (Credit—advanced standing—is not given for the General Test in English Composition.) Max mum credit allowed, 24 semester hours.

3. *Columbian College of Arts and Sciences Special Departmental Examina tions.*—A student may request any department of Columbian College to offer him a special examination covering the subject matter of any specific course (If an appropriate CLEP Subject Examination is available, the department may choose to employ it.) If a student performs satisfactorily, he may receive credit (advanced standing), waiver of requirement, or both, at the discretion of the department. (A student who has previously taken examinations to waive course requirements may not, however, at a later time take examinations for credit in the same courses.) Special departmental examinations will normally be of at least three hours' duration. A fee of $25 for each course examination is charged for preparing, administering, and grading. Maximum credit allowed for Associate's degree, 30 semester hours; maximum allowed for Bachelor's degree, 60 semester hours.

4. *Service Schools.*—A maximum of 30 (or a maximum of 12 hours if the courses are "professional") semester hours may be obtained on the basis of service schools satisfactorily completed, as evaluated in accordance with the "Guide to the Evaluation of Educational Experience in the Armed Forces," issued by the Committee on Accreditation of Service Experience. Ordinarily such subjects are counted as electives. No credit will be allowed for military experience as such.

5. *Correspondence Courses.*—A maximum of 15 semester hours may be earned through the successful completion of correspondence courses of college level which are offered by the U.S. Armed Forces Institute or a regionally ac credited college or university.

III. The minimum requirement for the Associate in Arts in General Studies degree is 60 semester hours; the minimum requirement for the Bachelor of General Studies degree is 120 semester hours. A minimum of 18 semester hours for the Associate's degree and a minimum of 30 hours for the Bachelor's de gree must be completed at George Washington University, but may be com pleted at any point in the student's program of study. At least 6 semester hours in the selected area of concentration must be taken at this University.

IV. The College of General Studies will handle and coordinate administra tive matters and be the point of contact with the college granting the degree. The provisions as stated in the *College of General Studies* catalogue will apply in all cases not specifically mentioned in this agreement.

V. Tuition and fees will be as stipulated in the *College of General Studies* catalogue on a year-to-year basis.

VI. Students accepted under this program are subject to the probation and suspension regulations of the University, and are required to maintain scholastic standards.

VII. In addition to trained counselors, University Representatives are assigned to each installation to assist in the counseling function.

Army Help for Education and Development (Project Ahead)

George Washington University is cooperating with the U.S. Army in Project AHEAD. The primary objective of the program is to permit affiliation of qualified young persons with the University upon their entrance into the Army. The University will open and maintain an active record file and assign a counselor to the student while he or she is in the Army. In effect The George Washington University becomes his or her alma mater. The counselor helps the student plan the course of study and advises which courses to pursue among those offered on or near the base or installation. After discharge from the Army, the veteran enrolls as a full-time student to complete the degree. Individuals designated as Project AHEAD students who desire to obtain an Associate's or a Bachelor's degree from George Washington University's Columbian College of Arts and Sciences will be assured of a degree completion program through the following procedures:

Students who are admitted under normal rules and regulations are required to register and pay a continuous registration fee for one semester. Upon completion of that semester students present their active duty orders and will be granted military leave for the period of active duty.

A student who is not readily admitted will be required to complete a 30 semester hour pre-qualifying program based upon the student's needs as evaluated. Upon successful completion of the program at accredited colleges or universities, the student will receive advanced standing and be admitted as a degree candidate based upon the current catalogue at that time. After that the procedure outlined above will apply.

A time limit of five years is imposed from the time of admission or commencement of the pre-qualifying program for the student to be readmitted and commence resident requirements at The George Washington University.

Accelerated Associate's Degree Completion Program

The Accelerated Associate's Degree Completion Program is available at Fort Myer in Virginia, and at the Washington Navy Yard in the District of Columbia.

This accelerated Program permits an individual to complete the degree of Associate in Arts in General Studies in approximately 18 months through part-time study. Time to complete the Program will vary according to the amount of advanced standing granted through transfer of credit or by examination and according to the number of courses the student is enrolled in. The Program is designed for the highly motivated individual who must complete his program of study in a limited period of time. Classes are open to everyone.

Graduate Degrees

MASTER OF ARTS

THE DEGREE OF MASTER OF ARTS with a field in Religion and Medical C is a degree program offered by the Graduate School of Arts and Sciences un the direction of the Department of Religion. Although certain courses in program are offered only through the College of General Studies' off-cam centers, candidates for this degree must register as campus degree candida in the Graduate School of Arts and Sciences.

The program of study is interdisciplinary and combines both professio and academic work. The intent of the program is (1) to provide training an academic graduate milieu of chaplains and clergymen whose professio effectiveness might be increased through the combination of clinical experien and academic study; (2) to provide a program of study for those medical st dents who have a sense of the significance of theological insights for the ca of the whole man and who desire to combine their medical education wi this correlative study; and (3) to provide a program of research and study the area of religion and medical care for those whose theological training (e in ethics or sociology of religion) and interest are directed toward a vocatio in teaching. Support for the program comes from (1) Clinical Training pro grams of the National Naval Medical Center, National Institutes of Healt and Walter Reed General Hospital; and (2) the departments of Health Ca Administration, Psychology, Religion, Sociology, and departments of th School of Medicine and Health Sciences.

The program of study leading to the degree of Master of Arts in the fiel of Religion and Medical Care consists of 36 semester hours of approved cours work with or without a thesis and the passing of a Master's Comprehensive Examination.

For information concerning admission requirements and the specific require ments for the degree, contact the Graduate School of Arts and Sciences or th Chairman of the Department of Religion.

MASTER OF ARTS IN EDUCATION

The School of Education has academic jurisdiction over the degree of Maste of Arts in Education. Off-campus degree programs are designed for educa tors who wish to increase their knowledge of professional and academic infor mation and to prepare for special types of educational service in public and private schools. They are also designed to further the preparation of indi viduals for non-traditional areas of education in both the public and private sectors of society, regardless of clientele, age, or institutional base.

The Master of Arts in Education degree programs offered at off-campus centers are available in the following fields: elementary education; higher edu cation; human resource development; secondary education; special education crisis-resource teaching, diagnostic-prescriptive teaching, early childhood spec education; supervision and human relations; and therapeutic recreation ada tive physical education.

Admission

For detailed information see "Admission as a Degree Candidate," page 17, and pages 23–26.

Requirements for the Degree

The program of study consists of a minimum of 33 or 36 semester hours of course work in core courses, depending upon the chosen field. The thesis (equivalent to 6 semester hours) is optional.

RESIDENCE

Advanced standing is granted for approved courses taken at other accredited institutions; however, a minimum of 30 semester hours must be completed at this University, with no less than 21 semester hours completed after admission to Master's degree candidacy.

SCHOLARSHIP

A quality-point index of 3.00 is required for graduation. Students who receive a grade of *C* in more than two courses are subject to suspension. Students who receive a grade of *F* must confer with the Dean of the School of Education before enrollment for further work.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on page 36.

Removing an Incomplete.—Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or a required paper) must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An "Incomplete" cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council. An "Incomplete" which is not removed within one calendar year is automatically changed to an *F*.

THE THESIS

Students who elect a thesis must register on campus for Educ 299–300. The choice of the thesis subject must be approved in writing by the student's adviser and filed in the Office of the Dean. A statement of the School of Education standards for the thesis and printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the perio registration, to the advice and direction of the member of the faculty u whom the thesis is to be written. In case a thesis is unfinished, an additi calendar year may be granted without further tuition payment. The stu must, however, maintain continuous registration (see page 40) during period. If the preparation of the thesis extends beyond the additional cale year, the student must register for the entire 6 hours of thesis again and tuition as for a repeated course.

TAKING COURSES ON CAMPUS

A student registered in a degree program off campus who wishes to register a course on campus, *must* file a formal graduate application which may be tained from the Office of the Dean of the School of Education.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to the course examinations, the candidate must pass a special thr hour comprehensive examination on his area of specialization. Candidates f the examination must be registered for the semester it is to be taken, and m file a written application in the Office of the School of Education no later th 30 days prior to the date of the examination.

EDUCATION SPECIALIST

The School of Education provides an off-campus program of advanced stud leading to the degree of Education Specialist in the field of Higher Educatio This program is for students with master's degrees in education who seek further professional preparation.

Admission

For detailed information see "Admission as a Degree Candidate," pages 1 and 25–26.

Requirements for the Degree

A minimum of 30 semester hours beyond the requirements of the degree Master of Arts in Education at this University is required. At least 21 hours this work must be in courses offered by this University, on campus or in th approved off-campus degree center to which the candidate has been admitte with the approval of the adviser, the remaining semester hours of the progra may be taken at another approved university. A maximum of five calend years is allowed for the completion of the program. At least 12 of the requir 30 hours must be in appropriate graduate courses in Education selected fro the following areas: (1) foundations and cognate study, (2) background an general principles of the field of study, (3) an area of specialization.

SCHOLARSHIP

Scholarship requirements for the degree of Education Specialist are the same as those for the degree of Master of Arts in Education (see page 69).

THE COMPREHENSIVE EXAMINATION

Successful completion of a six-hour written examination and/or an oral examination, at the option of the major field adviser, is required.

MASTER OF ARTS IN SPECIAL STUDIES AND MASTER OF SCIENCE IN SPECIAL STUDIES

The Graduate School of Arts and Sciences has academic jurisdiction over the degrees of Master of Arts in Special Studies and Master of Science in Special Studies. These degree programs provide a course of study appropriate to those students who wish to emphasize interdisciplinary work. They are offered both off and on campus. The programs off campus can only be offered for a group of students with mutual educational goals. The programs allow a maximum of flexibility; however, they must be developed around identified objectives and must provide a structured sequence of study toward these goals. University representatives will work with interested groups to develop suitable programs. The contemplated curriculum must be approved prior to admission to the Graduate School. A student interested in interdisciplinary work leading to one of these degrees who is not in a group program must register on campus.

For information on Special Studies programs currently available in off-campus programs, see "Special Degree Programs," pages 89-91.

For detailed information on the regulations for the off-campus degrees, see the *Handbook for Off-campus Students*, available at the Office of the Dean of the Graduate School of Arts and Sciences.

Admission

For detailed information, see "Admission as a Degree Candidate," page 17, and pages 24–25.

Requirements for the Degrees

The program of study consists of 36 semester hours of course work including a majority of courses in the arts and sciences (e.g., economics, natural sciences, political science, psychology, sociology, statistics), with not more than one-third from any single department. *There are no thesis or tool requirements.* Advanced undergraduate courses (those numbered 101–200) may be included in the program of study upon the approval of the Graduate School and with the provision that students complete additional work for graduate credit.

Each program of study must be approved by the Dean of the Graduate School of Arts and Sciences and the departmental advisers.

RESIDENCE

A minimum of 27 semester hours must be completed after admission to Ma ter's degree candidacy.

SCHOLARSHIP

Graduate students are expected to maintain a minimum accumulative grad average of *B* (3.00) in all course work in the program of studies. Individua departments may require a higher average.

In the case of a student who receives a grade of *F* for a course in his pro gram of studies, the Graduate School will require a departmentally approved written statement justifying the student's continuance in the Graduate School and outlining the program to be followed. Continuation is contingent upon the Dean's approval. A course in the program of studies for which an *F* is received cannot be subsequently removed from the program even though another course is taken as a substitute.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on page 36.

Removing an Incomplete.—An "Incomplete" must be made up before the lapse of one calendar year. An "Incomplete" which is not removed within one calendar year remains as a grade of *I* on the student's record. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

MASTER'S COMPREHENSIVE EXAMINATION

Master's degree candidates must pass a Master's Comprehensive Examination administered by the Graduate School of Arts and Sciences on campus on specified dates.

A student who fails to pass the Master's Comprehensive Examination may, in exceptional circumstances, and with the approval of the department and the Dean, repeat the Examination at the next scheduled date. If he fails a second time, no further opportunity to take the Examination is permitted.

Withdrawal

Graduate students who intend to withdraw from the Graduate School of Arts and Sciences should inform the School in writing. The last day for complete withdrawal without academic penalty is at the end of the eighth week of classes.

Leave of Absence

If a student is temporarily unable to continue his program of studies, he may request leave of absence for a specific period of time, not to exceed one cal-

endar year. When the period of leave has expired, it is the student's responsibility to notify the Graduate School at least two months in advance of a given registration period of his intention to reregister. If he fails to reregister, his candidacy will be terminated.

MASTER OF SCIENCE IN ADMINISTRATION

The School of Government and Business Administration has academic jurisdiction over the degree of Master of Science in Administration. This degree program provides a course of study appropriate for those students currently working in government or industry. It is a professional degree, preparing graduates for positions of higher and broader responsibility and generally improving their competence as administrators. Students expecting to continue in a doctoral program should consult the Committee on Doctoral Studies in the School of Government and Business Administration concerning necessary prerequisites. Students will usually find it advantageous to consult with the Committee early in planning their Master's degree programs.

The University cannot guarantee that all courses in this curriculum will be offered at every off-campus center. However, any student who has been admitted to degree candidacy may arrange to complete the curriculum by registering on campus. Only students with bachelor's degrees may register for courses numbered above the 200 level in the School of Government and Business Administration. All work for this degree must be completed in five years, unless an extension of time is granted by the Dean. Continuous registration does not extend a student's degree candidacy beyond the five-year time limit.

Objectives of the School of Government and Business Administration

The principal objective of the School of Government and Business Administration is to prepare its graduates for positions in the management of complex organizations in both business and government. The degree programs are designed to prepare students both for *entrance* into business and government and for *advancement* to high-level management positions.

Programs in the School include examination of administrative principles and quantitative approaches to decision-making common to both business and government. These programs stress the points at which major policy decisions of either business or government must give consideration to related policy decisions of the other. Emphasis is placed on the fact that management education is not limited to organizational techniques but is, in the broadest sense, education for management responsibility.

It is the policy of the School to emphasize a broad fundamental education as the best preparation for positions carrying management or administrative responsibility.

The degree of Master of Science in Administration develops the elements common to all management positions regardless of the nature of the operation. This degree program is based on the study of the principles of management, human relations, and problem-solving plus an area of specialization.

Admission

For detailed information see "Admission as a Degree Candidate," page 17, and pages 23–24.

Requirements for the Degree

RESIDENCE AND TRANSFER OF CREDIT

A minimum of 27 semester hours of graduate work must be completed while registered as a degree candidate in this off-campus program.

The thesis and thesis seminar (6 semester hours) may be included in the 27 hours of course work taken in residence. A maximum of one-quarter of the semester hours of graduate coursework required for the degree may be approved for transfer to the School of Government and Business Administration from the Division of University Students, the College of General Studies, another degree-granting division of this University, or another accredited college or university under the following conditions: the course work must be approved as part of the student's program of studies, it must not have been applied to the completion of requirements for another degree, it must be graduate-level course work, it must have been taken within the past two years and the student must have received a grade of *B* or better. This action must be approved by a petition to the adviser and the Dean. A transcript of the course work must be on file before the petition can be considered.

SCHOLARSHIP

An average of *B* or better is required for the Master's degree. The grade of *C* is not considered as failing but must be counter-balanced by a grade of *A* in a graduate course of equal status. A Master's degree candidate who receives a grade of *F* in a course required in his program of study is required to present cause for consideration by the Dean of the School of Government and Business Administration as to why he should be allowed to continue his studies toward a degree objective. A student whose scholarship is unsatisfactory may be suspended. A student who is subject to probation for a second time is automatically suspended.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on page 36.

Removing an Incomplete.—The grade of *I* must be removed no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, the instructor and a student may jointly petition the Dean, or the appropriate committee, for additional time in which to complete the work of the course. Such

petitions should be submitted within the same period. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

THESIS

With the approval of the adviser, a thesis may be substituted for 6 semester hours of course work.

The thesis subject and the thesis in its final form must be approved by the director of the thesis and the faculty adviser and presented to the Dean of the School of Government and Business Administration no later than the date announced in the calendar. Printed copies of detailed regulations regarding the form and reproduction of the thesis are available at the Office of Counseling and Information Services, College of General Studies.

Payment of tuition for the thesis entitles the candidate, during the two semesters he registers for thesis (299–300), to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, an additional successive academic year is granted without further tuition payment. The student must, however, maintain continuous registration during this period. If the preparation of the thesis extends more than three semesters beyond the date the student registers for thesis 300, he must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

COURSE SUBSTITUTION/ELECTIVES

Course substitution and electives must be selected in consultation with the faculty adviser and may be chosen from relevant offerings in accounting, business administration, management science, and public administration. Course substitutions and curriculum modifications must be approved by the faculty adviser and the Dean of the School of Government and Business Administration. Electives need only be approved by the faculty adviser. Forms are available at the Office of Counseling and Information Services, College of General Studies.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to individual course examinations the candidate must pass a general written Master's Comprehensive Examination. In writing the examination the student is expected to correlate what he has learned in his course work and his reading in the literature of his fields. The examination normally requires from seven to nine hours writing time. Sections broadly cover the various fields in which the candidate has prepared himself.

The examinations are scheduled three times a year, in November, April, and August, and should be taken during the last semester of course registration or shortly after completion of the prescribed course work. If there is a lapse of time between completion of course work and the taking of the examination, the student must maintain continuous registration and must be registered for the semester or summer session in which the examination is taken.

The candidate should consult with his adviser, well in advance, as to the dates of his examination and the definition of the subject-matter fields which

his examination is to cover. A written application is filed no later than 30 days prior to the examination date. Before applying for the examination, the student must have completed all of the required courses in his program or be enrolled in his last semester, and he must have achieved a 3.00 *(B)* average. *After applying for the examination, a candidate may withdraw only by notice in writing to the appropriate department chairman. Failure to take the examination without an official withdrawal constitutes a failure for the examination.*

A candidate who fails the examination may, in exceptional circumstances and with specific approval of his advisers, repeat the examination, but only after the lapse of one semester and the undertaking of additional preparation as prescribed. *If he fails a second time, no further opportunity to take the examination will be permitted.*

Areas of Concentration

The Master of Science in Administration degree program consists of 36 semester hours of graduate work. Areas of concentration usually include a core of courses in economics, management science, and business-government relations. These core courses are included in each of the areas of concentration. Courses are listed in the generally recommended sequence in which they should be taken. Faculty advisers should be consulted for more specific guidance. In areas of concentration where the course work requires prerequisites, these prerequisites generate semester hour requirements over and above the basic 36 hour program.

I. ADMINISTRATION OF SCIENCE AND TECHNOLOGY

Faculty Adviser: Daniel D. Roman, Professor of Management Science, Government 310, Telephone 676-6678.

The field of concentration in Administration of Science and Technology explores the many aspects of technology relating to and influencing research and development management, business, and public policy. The employment of "state-of-the-art" technology and the creation of new technology through research and development are important processes in the achievement of the objectives of both private firms and governments.

The research and development environment has many unique operational characteristics. The program of graduate study in this concentration has been designed to identify and study the problems associated with managing creative professional people in a dynamic technology. As a contextual area, the program stresses the need for students to undertake original and meaningful research involving political, economic, sociological, and operational problems encountered by management in industrial, governmental, and military research and development organizations.

Mgt 201: Advanced Administrative Management (3)
BAd 220: Administration of Research and Development (3)
*Mgt 225: Managerial Statistics I (3)
PAd 235: Technology Change and Professional Human Resource Planning (3)

* See departmental listings in this catalogue for prerequisite courses.

Econ 217–18: Survey of Economics (3–3)
*BAd 222: International Research and Development (3)
Mgt 240: Survey of Information Technology (3)
Mgt 260: Introduction to General Systems and Cybernetics (3)
*Mgt 207: Human Behavior in Organizations (3)
PAd 262: Seminar: Science, Technology, and Public Policy (3)
*BAd 229: Seminar: Administration of Research and Development (3)

II. BEHAVIORAL SCIENCES IN ORGANIZATION DEVELOPMENT

Faculty Advisers: Erik K. Winslow, Associate Professor of Behavioral Sciences, Government 409, Telephone 676-6447; Jerry Harvey, Professor of Management Science, Building Y, Room 10, 2131 G Street, N.W., Telephone 676-6205.

This area of concentration reflects the assumption that the effective utilization of the behavioral sciences is concerned with both means and ends; that the specialist in behavioral science not only is skilled in theory and research but also applies his technical and specialized knowledge as a conscious force in effective organizational growth and improvement. Thus, courses are designed to equip the student with organizational concepts and behavioral skills appropriate to optimizing the utilization of a system's total resources.

This program is designed to fulfill the need for professionals capable of designing, creating, and developing the necessary behavioral and organizational systems appropriate to rapidly changing societies. Emphasis is on the interrelationships of such dimensions as motivation, leadership, problem-solving, organizational growth, and increased complexity of modern organizations and their effect upon the function of organizational development.

Mgt 201: Advanced Administrative Management (3)
Mgt 204: Quantitative Factors in Administration (3)
*Mgt 207: Human Behavior in Organizations (3)
Mgt 240: Survey of Information Technology (3)
Econ 220: Survey of Principles and Issues in Economics (3)
BAd 202: Business-Government Relations (3)
*†Mgt 208: Current Issues in Organizational Behavior (3)
*†Mgt 210: Behavioral Factors in the Process of Change (3)
*†Mgt 212: Organizational Development: Concepts and Methods (3)
Mgt 260: Introduction to General Systems and Cybernetics (3)
*Mgt 261: Fundamentals of General Management Systems and Organizational Cybernetics (3)

Elective: To be selected from the following as approved by the adviser (3)
BAd 211: Leadership and Executive Development (3)
*†Mgt 213: Consultative Processes in Organizations (3)
PAd 223: Behavioral Factors in Large Organizations (3)
PAd 233: Seminar: Manpower Development and Utilization (3)
†Psyc 245: Seminar: Organizational Behavior (3)

III. BUSINESS FINANCIAL MANAGEMENT

Faculty Adviser: Rodney W. Eldridge, Associate Professor of International Finance, Government 400, Telephone 676-6892.

* See departmental listings in this catalogue for prerequisite courses.
† Offered only on campus

This area of concentration provides a background in business budgeting, controllership, treasury, long-range planning, reporting, and financial management processes. Courses are designed to emphasize the planning, analysis, implementation, and controls necessary for making effective financial decisions.

Mgt 201:	Advanced Administrative Management (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)
BAd 202:	Business-Government Relations (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
*BAd 231:	Financial Decision-making (3)
*Acct 215:	Management Accounting (3)
*Mgt 225:	Managerial Statistics I (3)
*BAd 233:	International Business Finance (3)
*BAd 234:	Seminar: Capital Formation (3)
*BAd 237:	Investment Analysis (3)
Elective:	To be selected with the approval of the adviser (3)

IV. GENERAL MANAGEMENT SYSTEMS AND ORGANIZATIONAL CYBERNETICS

Faculty Adviser: Richard F. Ericson, Professor of Management, Lisner Hall 601. Telephone 676-7155.

This concentration addresses the critical need for management to deal effectively with human institutions that tend to become larger and more complex. In many traditional academic fields general systems and cybernetic concepts have evolved as the interdisciplinary mode for understanding increasingly complex systems. This program is essentially interdisciplinary and transcontextual in nature. The student is afforded a range of opportunities to apply educational experience to managerial, organizational and societal problems.

Econ 220:	Survey of Principles and Issues in Economics (3)
BAd 202:	Business-Government Relations (3)
Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)
Mgt 260:	Introduction to General Systems and Cybernetics (3)
*Mgt 261:	General Management Systems and Organizational Cybernetics (3)
*Mgt 263:	Case Studies and Field Research in GEMSOC (3)
*Mgt 264:	Organizational Dynamics Simulation and Metasystemic Modeling (3)
Electives:	To be selected from the following as approved by the adviser (6)
*Mgt 241:	Management Information Systems Development and Application (3)
*†Mgt 208:	Current Issues in Organizational Behavior (3)
PAd 214:	Policy Analysis in Public Administration (3)
PAd 262:	Seminar: Science, Technology and Public Policy (3)
Mgt 295:	Research Methods
*Mgt 225:	Managerial Statistics I (3) (If this elective is chosen, Mgt 204 may not be taken.)
Econ 217–18:	Survey of Economics (3–3) (If this combination is chosen, Econ 220 may not be taken.)

* See departmental listings in this catalogue for prerequisite courses.
† Offered only on campus

V. INDUSTRIAL MANAGEMENT

Faculty Adviser: Guy Black, Professor of Business Administration, Government 302, Telephone 676-7139 or (703) 278-8074.

This area of concentration prepares students for careers in industrial management. Work covers the organization and functioning of industrial firms as well as the management practice and problems associated with them.

*Acct 215:	Management Accounting (3)
Econ 217:	Survey of Economics (3)
Mgt 201:	Advanced Administrative Management (3)
*Mgt 207:	Human Behavior in Organizations (3)
*Mgt 225:	Managerial Statistics I (3)
Mgt 240:	Survey of Information Technology (3)
BAd 202:	Business-Government Relations (3)
BAd 208:	Personnel Management and Industrial Relations (3)
*BAd 225:	Seminar: Manufacturing Production (3)
*BAd 261:	Applied Microeconomics (3)
BAd 279:	Purchasing and Materials Management (3)
*BAd 297:	Business Policy Formulation (3)

VI. INFORMATION SYSTEMS TECHNOLOGY

Faculty Advisers: John F. McCarthy, Jr., Associate Professor of Business Administration, Government 302, Telephone 676-7089; Walton E. Smith, Associate Professor of Management Science, Building Y, Room 21, 2131 G Street, N.W., Telephone 676-7159.

This area of concentration is designed to provide a managerial understanding of the principles of manual, mechanical, and electronic information processing, including computer programming concepts, methods, and languages; an appreciation of the capabilities, limitations, and selection procedure of information processing equipment; a knowledge of all phases of management information systems development, implementation, and evaluation; and an understanding of the roles of both management and systems personnel in information technology. It also provides an appreciation of the role of information technology as a tool of management.

Students actually participate in the development of management information systems; in the selection of computer equipment; and in the installation, management, and evaluation of management information systems during class sessions.

Mgt 201:	Advanced Administrative Management (3)
Mgt 240:	Survey of Information Technology (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 260:	Introduction to General Systems and Cybernetics (3)
*Mgt 225:	Managerial Statistics I (3)
*Mgt 241:	Management Information Systems Development and Application (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
*Mgt 242:	Comparative Computer Systems (3)
BAd 202:	Business-Government Relations (3)
*Mgt 243:	Management of Information Technology (3)
Electives:	To be selected from the following as approved by the adviser (6)

*See departmental listings in this catalogue for prerequisite courses.

*Mgt 244:	Information Systems and Telecommunication (3)
*Mgt 245:	Data Base Management (3)
*Mgt 249:	Seminar: Information Technology (3)

VII. INTERNATIONAL COMMERCE

Faculty Adviser: Jack Zwick, Professor of Business Administration, Governm
403, Telephone 676-6726.

This area of concentration prepares students for careers in firms operating o
multinational basis or about to enter the international field; for careers in t
federal government and in international agencies concerned with business, i
dustry, and finance abroad; and for the commerce option of the Foreign Ser
ice Officer Examination.

Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
BAd 202:	Business-Government Relations (3)
*BAd 233:	International Business Finance (3)
BAd 248:	International Marketing (3)
BAd 255:	Multinational Corporations in the World Economy (3)
BAd 256:	Seminar: International Trade (3)
*BAd 257:	Business Policy in the Multinational Firm (3)
Elective:	To be selected with the approval of the adviser (3)

VIII. MANAGERIAL ACCOUNTING

Faculty Adviser: Anthony J. Mastro, Professor of Accounting, Government 302
Telephone 676-6055.

This area of concentration provides a knowledge of interrelated systems of a
counting in planning and control for management. Emphasis is on the require
ments of management for accounting information with concern for general and
corporate accounting principles to the extent related to the managerial accoun
ing functions.

Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
BAd 202:	Business-Government Relations (3)
*BAd 231:	Financial Decision-making (3)
*†Acct 215:	Management Accounting (3)
Acct 262:	Business Income Taxation (3)
*†Acct 275:	Contemporary Auditing Theory and Procedures (3)
*Acct 276:	Management Planning and Control (3)
*†Acct 282:	Accounting Information Systems (3)
*Acct 296:	Seminar in Accounting (3)

* See departmental listings in this catalogue for prerequisite courses.
† If Acct 215 or a similar management accounting course has been taken prior to entrance into t
program, students must take Acct 275 and Acct 282; if not, then students must take Acct 215 a
either Acct 275 or Acct 282.

IX. PERSONNEL MANAGEMENT

Faculty Adviser: Roy B. Eastin, Professor of Business Administration, Government 311, Telephone 676-6063.

This area of concentration provides a basic academic and professional foundation, equipping the student for administrative responsibility in personnel management. The courses cover the fields of personnel management, industrial relations, unionism, collective bargaining, labor relations, and manpower development and utilization.

Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
BAd 202:	Business-Government Relations (3)
BAd 208:	Personnel Management and Industrial Relations (3)
BAd 209:	Seminar: Personnel Management (3)
BAd 212:	Unionism and Collective Bargaining (3)
*BAd 213:	Current Issues in Unionism, Collective Bargaining, and Labor Relations (3)
PAd 233:	Seminar: Manpower Development and Utilization (3)
Elective:	To be selected with the approval of the adviser (3)

X. PROCUREMENT AND CONTRACTING

Faculty Adviser: Stanley N. Sherman, Associate Professor of Business Administration, Government 312, Telephone 676-7462.

This area of concentration provides a basic academic and professional foundation, equipping the student for administrative responsibility in procurement and contracting. The courses cover industrial purchasing, procurement activities of the federal government, and contracting activities of vendors to the federal government.

Mgt 201:	Advanced Administrative Management (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
BAd 279:	Purchasing and Materials Management (3)
BAd 202:	Business-Government Relations (3)
Mgt 204:	Quantitative Factors in Administration (3)
Mgt 240:	Survey of Information Technology (3)
BAd 280:	Procurement and Contracting (3)
*Mgt 207:	Human Behavior in Organizations (3)
*BAd 282:	Government Contract Administration (3)
*BAd 283:	Pricing and Negotiation (3)
*BAd 285:	Systems Procurement and Project Management (3)
Elective:	To be selected with the approval of the adviser (3)

XI. PUBLIC ADMINISTRATION

Faculty Advisers: David S. Brown, Professor of Management, Government 302, Telephone 676-6619; Stephen R. Chitwood, Associate Professor of Public Administration, Building D, Room 405, Telephone 676-6064.

*See departmental listings in this catalogue for prerequisite courses.

This area of concentration provides a background in the basic fundament of public administration. The courses are designed to reflect the current theo as well as the practical and analytical concepts associated with the administ tion of governmental functions. As the student will note, the area of conce tration focuses primarily on the federal government. An option address urban and regional administration.

Core Courses

Econ 217–18:	Survey of Economics (3–3)
Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
*Mgt 207:	Human Behavior in Organizations (3)

Area of Concentration

PAd 210:	Concepts and Issues in Public Administration (3)
PAd 213:	Administration in the Federal Government (3)
PAd 223:	Behavioral Factors in Large Organizations (3)
PAd 245:	Intergovernmental Relations (3)
PAd 251:	Governmental Budgeting (3)
PAd 260:	Policy Formulation and Administration (3)
Elective:	To be selected with the approval of the adviser (3)

Option in Urban and Regional Administration

To accommodate the needs of those students whose major interest is in urban and regional public administration, the following curriculum may be undertaken under special arrangements with the College of General Studies and the department of public administration.

PAd 210:	Concepts and Issues in Public Administration (3)
PAd 223:	Behavioral Factors in Large Organizations (3)
PAd 245:	Intergovernmental Relations (3)
PAd 248:	Financing Local Government (3)
PAd 249:	Urban Public Policy (3)
PAd 250:	Administration of State and Local Governments (3)
PAd 260:	Policy Formulation and Administration (3)

XII. QUANTITATIVE ANALYSIS FOR DECISION-MAKING

Faculty Adviser: William W. Hardgrave, Associate Professor of Management Scienc Building Y, Room 20, 2131 G Street, N.W., Telephone 676-6852.

This area of concentration develops an understanding of quantitative ap proaches to problems of managerial control and decision-making. While the program will develop a competent background in basic mathematical theory associated with the various techniques, it is oriented towards applications of the techniques rather than their theoretical mathematical content.

Mgt 201:	Advanced Administrative Management (3)
*Mgt 207:	Human Behavior in Organizations (3)

* See departmental listings in this catalogue for prerequisite courses.

Mgt 240: Survey of Information Technology (3)
Econ 220: Survey of Principles and Issues in Economics (3)
BAd 202: Business-Government Relations (3)
*Mgt 225: Managerial Statistics I (3)
*Mgt 226: Managerial Statistics II (3)
*Mgt 227: Mathematical Programming: Techniques and Applications (3)
*Mgt 228: Techniques of Operations Research (3)
*Mgt 229: Seminar: Management Science and Operations Research (3)
Electives: To be selected from the following as approved by the adviser (6)
*BAd 225: Seminar: Manufacturing Production (3)
*Mgt 242: Comparative Computer Systems (3)
Mgt 260: Introduction to General Systems and Cybernetics (3)

MASTER OF SCIENCE

The School of Engineering and Applied Science in cooperation with the National Aeronautics and Space Administration's Langley Research Center, Hampton, Virginia, has a graduate engineering program at NASA-Langley. NASA-Langley's extensive scientific and engineering facilities and equipment are available to students in this program.

The programs at NASA-Langley lead to the degree of Master of Science in the fields of acoustics, aerospace engineering, environmental modeling, structures and dynamics, flight sciences, fluid mechanics and thermal sciences, solid mechanics and materials science, electrical engineering, and computer science. These programs are open to qualified NASA employees and area residents. With the approval of the instructor, courses may be taken in nondegree status.

The School of Engineering and Applied Science in cooperation with the Naval Ship Research and Development Center, Carderock, Maryland, has a graduate engineering program leading to the degree of Master of Science in the field of ocean and marine engineering. The program is open to qualified NSRDC employees and area residents.

The School of Engineering and Applied Science has academic jurisdiction over these degree programs which are administered by the College of General Studies.

Admission

For detailed information see "Admission as a Degree Candidate," page 17, and page 25.

Requirements for the Degree

The minimum program consists of 24 semester hours of approved graduate courses and a Master's thesis (equivalent to 6 semester hours). The student may elect an optional program without a thesis which consists of a minimum of 33 semester hours of approved graduate courses. All Master's candidates

* Departmental listings in this catalogue for prerequisite courses.

are required to pass a Master's Comprehensive Examination. Students wh undergraduate study does not include necessary prerequisites may be requ to take more than the minimum semester hours required.

Upon admission the student is assigned an adviser. Programs of study determined by any prerequisites established and the requirements of the dep ment in which the student wishes to study. The program of studies in prep tion for the Master's Comprehensive Examination must be approved by student's adviser and the appropriate department chairman.

SCHOLARSHIP

For Master's work, a minimum of 24 semester hours (for those who rece credit for a thesis) or 33 semester hours (for those who follow the optional p gram without a thesis) of graduate course work with the grade of *B* or higher required for graduation. Students who receive two grades of *F*, or three gra below *B*, are barred from further enrollment in graduate courses and, ordinari will not be readmitted to graduate study. Students who receive the grade of in one or two courses are required to take additional course work to make the minimum semester hours of work with grades of *B*.

INCOMPLETE AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authoriz Withdrawal) may be assigned are described on page 36.

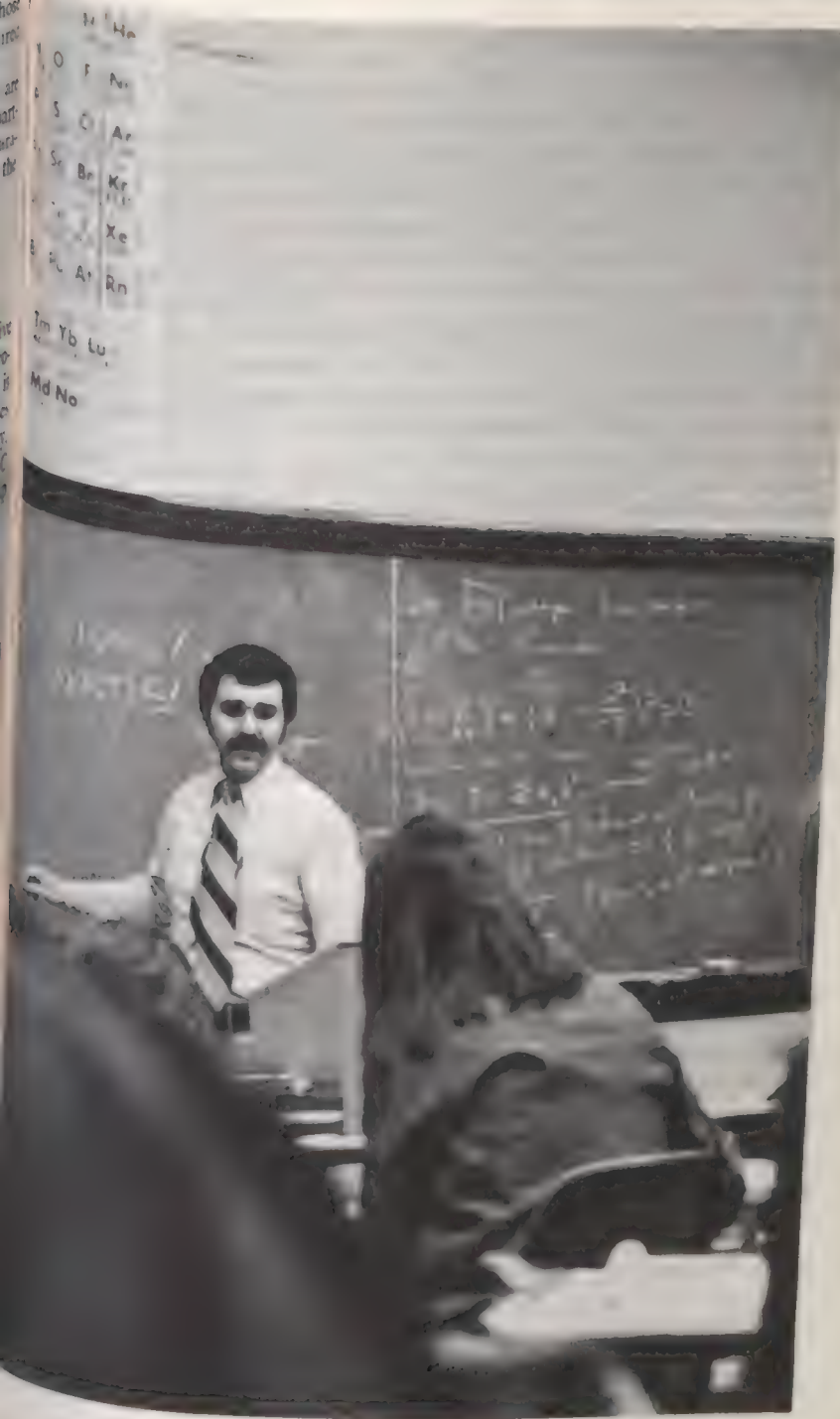
Removing an Incomplete.—Although the grade of *I may* remain on the rec ords for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An "Incomplete" which is not removed within one calendar year is automatically changed to an *F*.

RESIDENCE

In general, a minimum of one year of full-time study, or the equivalent in part time study, must be completed in the School of Engineering and Applied Science.

MASTER'S THESIS

In those programs requiring a thesis, the degree candidate must submit an ac ceptable thesis to demonstrate his ability to make independent use of the knowledge and discipline of thought acquired and developed by graduate study, to furnish objective evidence of constructive power in a given field, and to demonstrate that he can communicate the results of his work in writing. Work of a suitable character for which the student has professional responsibility may be considered, whether done on or off campus, provided no significant amount of work is completed without faculty supervision.



As a part of registration for the thesis course 299, the candidate must sub to the appropriate department chairman (on the form obtainable at the Sch office) his thesis area, approved by his faculty adviser. He must submit thesis title to the Dean, on the form available in the School office, at the beg ning of the semester in which he expects to graduate. Registration in th 299–300 entitles the student, during such registration, to the advice of the me ber of the faculty under whom the thesis is to be written. He may consult adviser, but the thesis is the exclusive responsibility of the student.

The thesis in final form must be submitted to the appropriate departme chairman by the date stated in the calendar for the semester in which the c didate enrolls in thesis 300. In case a thesis is unfinished on the date specifi the student will be granted an additional semester and must pay the "Conti ous Registration" fee (see page 40) unless he is registered for course work the preparation of the thesis extends beyond the three semesters, approval an extension of time will be required and the student must reregister for the 300 and pay tuition as for a repeated course.

A thesis may be submitted in final form one time. The acceptability of t thesis is determined exclusively by the Master's Comprehensive Examinati committee. If the thesis is unacceptable, the student's graduate status is term nated.

Printed copies of detailed regulations regarding the form and reproduction the thesis are available in the Office of the School. Accepted theses, with a companying drawings, become the property of the University and are deposi in the University Library, where the duplicate copies are bound and ma available for circulation.

OPTIONAL MASTER'S PROGRAM WITHOUT A THESIS

The student may elect an optional program without a thesis which consists minimum of 33 semester hours of approved graduate courses.

MASTER'S COMPREHENSIVE EXAMINATION

After completing his prescribed program, the candidate must pass a Mast Comprehensive Examination, to demonstrate substantial understanding of p ciples and method and their use in the area of his interest. This Examina may be written, oral, or both. A graduate student who fails any portion o Master's Comprehensive Examination on his first attempt may be examine more time if approval is given by the appropriate Examining Committe the event of failure to complete the Examination satisfactorily, the stu graduate status terminates.

TIME TO COMPLETE MASTER'S DEGREE REQUIREMENTS

A full-time Master's candidate is allowed a maximum of three calendar to complete all degree requirements, from the date of his first graduate- status registration in prerequisite or graduate courses. A part-time Ma candidate is allowed a maximum of five calendar years. The time limit does

include any period of registration as an unclassified student before admission to graduate student status, nor does it encompass any specified period spent on approved leave of absence. Readmission is required upon expiration of leave of absence under the conditions and requirements then prevailing.

Students who do not complete degree requirements within the allowed time have their graduate status terminated. They may be readmitted to graduate status under conditions specified by the department chairman and approved by the Dean.

MASTER OF ENGINEERING ADMINISTRATION

The School of Engineering and Applied Science, in cooperation with the U.S. Army Engineer School, Fort Belvoir, Virginia; the Fairfax County Government, Fairfax, Virginia; and the Naval Ordnance Station, Indianhead, Maryland; offers a graduate program leading to the Degree of Master of Engineering Administration. The program is open to employees of these organizations and area residents.

The School of Engineering and Applied Science has academic jurisdiction over this degree program which is administered by the College of General Studies.

Admission

For detailed information see "Admission as a Degree Candidate," page 17, and page 25.

Requirements for the Degree

The requirements for the degree of Master of Engineering Administration are the same as those listed under the degree of Master of Science (see pages 83–87).

DOCTOR OF SCIENCE*

The Doctor of Science degree program offered by the School of Engineering and Applied Science is designed to prepare the student for a career of creative scholarship by providing a broad, balanced background of knowledge and guidance in the performance of research. It requires study of interrelated fields of learning as well as original research in the field of central interest. The doctoral program for each student is determined, on an individual basis, by the student and his adviser. Work for the doctoral degree must be done in residence on campus except when special permission is granted by the chairman of the department.

*Complete information on the Doctor of Science degree program is contained in the *School of Engineering and Applied Science Catalogue*.

Admission

For detailed information see "Admission as a Degree Candidate," page 17. page 26.

Requirements for the Degree

The program of study for the degree of Doctor of Science is divided into stages. The first—made up of a study of interrelated fields of learning which supports the general area of research concentration—culminates in the qualifying examination. The second—composed of research investigation of a particular subject in a special field and the presentation of such research findings in a written dissertation—culminates in the final examination. The general requirements for the Doctor of Science degree are (1) a minimum of 30 semester hours of course work beyond the Master's degree in preparation for the qualifying examination; (2) a reading knowledge of one foreign language, preferably Russian; (3) the satisfactory completion of the qualifying examination; (4) a dissertation, equivalent to a minimum of 24 semester hours; and (5) the satisfactory passing of the final oral examination.

The candidate must submit to the appropriate department five complete copies of the dissertation and two original copies of an abstract (not to exceed 600 words) of his dissertation no later than the date specified in the calendar. One copy of the abstract is for inclusion in the announcement of the examination and one for reproduction by University Microfilms, Inc. One copy of the dissertation is also sent to University Microfilms, Inc.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation, preparation of the abstract, and services offered by University Microfilms, Inc., are available at the School Office. The successful candidate for the doctorate is required, before receiving his degree, to pay a fee to cover a part of the expense of printing the abstract of his dissertation, and for the basic service rendered by University Microfilms, Inc. Accepted dissertations, with accompanying drawings, become the property of the University and are deposited in the University Library where bound copies are available for circulation.

LANGUAGE REQUIREMENT

A doctoral student should maintain a broad outlook as he pursues his study and therefore must have the capability of reading appropriate literature published in a foreign language. Accordingly, a reading knowledge of one foreign language, preferably Russian, must be demonstrated before admission to the qualifying examination. If the student wishes to satisfy this requirement with a language other than Russian, he must obtain the approval first of his doctoral adviser, then of his department chairman; permission to use a language other than Russian will be granted on the basis of its importance to the student's field of interest.

TOOL REQUIREMENT

In addition to the language requirement, an examination in a tool requirement (e.g., computer programming) may be established by the various departments

SCHOLARSHIP

To be admitted to the qualifying examination, the doctoral student must achieve an over-all academic average of 3.20 on a scale of 4 (a grade of *A* equals 4 points; *B*, 3 points; *C*, 2 points; and *F*, 0 points). No doctoral student may receive more than two course grades below *B*. If he does receive more than two course grades below *B*, his graduate study is terminated and his further enrollment prohibited. Courses in which the student earns grades below *B* are not included in his total semester-hour requirement for the degree. In the event a student receives any grade below *B*, he is required to consult with his adviser for a review of his program of study and discussion of possible changes therein.

SPECIAL DEGREE PROGRAMS

Master of Arts in Special Studies (Criminal Justice)

A new program of study leading to the degree of Master of Arts in Special Studies with a concentration in Criminal Justice is offered off campus by the Graduate School of Arts and Sciences. This interdisciplinary degree program consists of study in criminology, forensic sciences, law, management science, psychology, and sociology, and is particularly appropriate for law enforcement personnel or for students considering a career in law enforcement. For further information, contact one of the following: Richard C. Allen, Chairman of the Department of Forensic Sciences, telephone 676–7390; the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676–6210; or College of General Studies Staff Members—Ralph I. DeBelles, Director of District of Columbia Credit Programs, telephone 676–7061; Douglas Carter, Director of Maryland Credit Programs, telephone 676–7022; John A. Morrow, Director of Virginia Credit Programs, telephone 676–7040.

Master of Arts in Special Studies (Legislative Affairs)

A program of study leading to the degree of Master of Arts in Special Studies with a concentration in Legislative Affairs is offered off campus by the Graduate School of Arts and Sciences. The program, focusing on the Congress of the United States, includes course work in legislative theory and research, the process of politics, and public policy analysis. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676–7010, or Harvey D. Snyder, Associate Director of District of Columbia Credit Programs, College of General Studies, telephone 676–7028.

Master of Arts in Special Studies (Urban Learning)

A program of study leading to the degree of Master of Arts in Special Studies with a concentration in Urban Learning is offered off-campus by the Graduate School of Arts and Sciences. The curriculum is designed to improve the urban planner's and city teacher's understanding of the environment in which he or

she operates, with emphasis on social problems. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676–6210, or William C. Shelton, Sr., Associate Director of District of Columbia Credit Programs, College of General Studies, telephone 676–706

Master of Science in Administration

In cooperation with the Industrial College of the Armed Forces, Fort McNair, Washington, D.C., a program of study leading to the degree of Master of Science in Administration is offered by the School of Government and Business Administration. The program is open only to current students and faculty of the Industrial College of the Armed Forces. For further information, contact Harry R. Page, Faculty Adviser for the Industrial College of the Armed Forces Program, School of Government and Business Administration, telephone 676-6380, or LeRoy S. Paul, Associate Director of District of Columbia Credit Programs, College of General Studies, telephone 676-7062.

Master of Science in Special Studies (Environmental Science)

A program of study leading to the degree of Master of Science in Special Studies with a concentration in Environmental Science is offered off campus by the Graduate School of Arts and Sciences. The curriculum is designed to improve the student's understanding of the environment in which he or she operates with emphasis on problems of the work place. It includes industrial hygiene and health, environmental impacts, economics and resource management, technology and public policy, and biostatistics. For further information contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676-6210.

Master of Science in Special Studies (Oral Biology)

In cooperation with the Army Institute of Dental Research of the Walter Reed Army Medical Center, a program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology is offered by the Graduate School of Arts and Sciences. The program is open to dental officers serving on active duty with the U.S. Armed Forces or with other federal agencies. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676-6210, or Edward F. Wright, Associate Director of Maryland Credit Programs, College of General Studies, 676-7024.

Master of Science in Special Studies (Social and Economic Statistics)

A program of study leading to the degree of Master of Science in Special Studies with a concentration in Social and Economic Statistics is offered off campus by the Graduate School of Arts and Sciences. The program is offered

only to students at the International Statistical Program Center of the U.S. Bureau of the Census. It is designed to give a knowledge of the theories, concepts, principles, and literature of social and economic statistics, and background and management leadership in staff development as it relates to planning and implementation of statistical analyses. The curriculum includes demographic and statistical methods, management and organization, and economic and social development. For further information contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676-6210.

Master of Science in Special Studies (Telecommunication Operations)

A program of study leading to the degree of Master of Science in Special Studies with a concentration in Telecommunication Operations is offered off campus by the Graduate School of Arts and Sciences. This program is designed to introduce personnel with technical backgrounds in communications to related work in the field of business administration, economics, management science, political science, sociology, and statistics. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676–6210, or one of the following College of General Studies Staff Members—LeRoy S. Paul, Associate Director of District of Columbia Credit Programs, telephone 676-7062; William C. Robinson, Associate Director of Virginia Credit Programs, telephone 676-7064.

OFF-CAMPUS LOCATIONS OF THE COLLEGE OF GENERAL STUDIES

DISTRICT OF COLUMBIA

Bolling Air Force Base, Washington, D.C. 20332

Education Director: Edward Corbin
Office: Building 500
Telephone: 767-5348
Representative for the University: LeRoy S. Paul
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Open to military and civilian personnel

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Education Director: Bruce Robinson, Chief, Employee Development Branch
Office: Room 3525, Commerce Department Building, 14th Street and Constitution Avenue, N.W.
Telephone: 967-7075 or 967-7076

BUREAU OF NARCOTICS AND DANGEROUS DRUGS, WASHINGTON, D.C. 20573

Education Director: N.E. Bentson, Personnel Officer
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Telephone: 382-4231

CIVIL SERVICE COMMISSION, WASHINGTON, D.C. 20415

Anthony W. Hudson, Director of Personnel and Labor Relations
For information contact Employee Development Officer, Personnel Division
Office: Room 1679, 1900 E Street, N.W.
Telephone: 632-5400

COAST GUARD, WASHINGTON, D.C. 20591

W.I. Barry, Chief, Training Section, Headquarters Civilian Personnel Branch (CAS-5/81)
Office: Room 8114A, Nassif Building, 400 7th Street, S.W.
Telephone: 426-2342

DEPARTMENT OF JUSTICE, WASHINGTON, D.C. 20530

Education Director: Jack Rottman, Chief, Career Development Section
Office: Room 1623, 10th Street and Pennsylvania Avenue, N.W.
Telephone: 739-5255

DEPARTMENT OF LABOR, WASHINGTON, D.C. 20210

Office: Room C5510, 200 Constitution Avenue, N.W.
Telephone: 523-6662

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Education Director: Patricia Tinker, Employee Development Specialist
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Telephone: 426-3320

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Education Director: Thomas Tate
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FEDERAL RESERVE SYSTEM, WASHINGTON, D.C. 20551

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Telephone: 737-1100, Extension 404

GENERAL SERVICES ADMINISTRATION, WASHINGTON, D.C. 20405

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Telephone: 964-6101

INTERSTATE COMMERCE COMMISSION, WASHINGTON, D.C. 20423

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Telephone: 737-9765, Extension 7116

NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C. 20550

Career Development and Training Officer: H.F. Blackner
Office: 1800 G Street, N.W.
Telephone: 632-4106

U.S. POSTAL SERVICE, WASHINGTON, D.C. 20260

Education Directors: Francis J. Mahaney; J.A. Matukonis, Training Division, Bureau of Personnel
Office: Room 205, 6900 Wisconsin Avenue, Chevy Chase, Md.
Telephone: 656-9125

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Telephone: 389-3101

Forrestal Building, L'Enfant Plaza, Washington, D.C. 20314

Education Director and Chairman of the Armed Forces Education and Training Advisory Council: Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 697-8015 or 697-2823

Program Coordinators: Donald A. Poliquin, Brenda Lee Baron
Office: Room GE222, Forrestal Building
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Representative for the University: William C. Robinson
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Industrial College of the Armed Forces, Fort McNair, Washington, D.C. 20319

Coordinator: Bernard S. Waterman
Office: Room D–281, Industrial College of the Armed Forces
Telephone: 693-8507

Director for the University: Harry R. Page
Office: Room 308, Hall of Government, 710 21st Street, N.W.
Telephone: 676-7250
Representative for the University: LeRoy S. Paul
Telephone: 676-7062
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Library of Congress, Washington, D.C.

Capitol Hill Graduate and Undergraduate Programs
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Telephone: 676-7028

Naval Research Laboratory, Washington, D.C. 20032

Education Specialist: Sylvia Wahler
Office: Navy Research Laboratory, Bldg 72
Telephone: 767-2956
Representative for the University: LeRoy S. Paul
Telephone: 676-7062

Naval Security Station, 3801 Nebraska Avenue, N.W., Washington, D.C. 20390

Education Services Officer: Danny Snare
Telephone: 282-0860

NAVAL TELECOMMUNICATIONS COMMAND, 4401 MASSACHUSETTS AVENUE, N.W., WASHINGTON, D.C. 20370
epresentative for the University: LeRoy S. Paul
Telephone: 676-7062

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alter Reed Army Medical Center, Washington, D.C. 20012

. William A. Ayer, Chief, Professional Development
Office: Building 40
Telephone: 576-3443
presentative for the University: Edward B. Wright
Telephone: 676-7024
en to military personnel assigned to duty and graduate study at USAIDR

alter Reed Army Medical Center, Washington, D.C. 20012

ucation Officer: Robert E. Hynes
Office: Building B-12, Room 34
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resentative for the University: Edward B. Wright
Telephone: 676-7024
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ffice: Building 92, Anacostia Naval Station
elephone: 433-2032
Campus for Achievement: Jan Goldstien
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elephone: 433-3182

Employee Development Officer: John Barber
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Representative for the University: Harvey Snyder
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MARYLAND

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Aberdeen Area Education Director: John L. Lichi, Chief, Educational Services Division
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Representative for the University: Frank Dulong
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Defense Mapping Agency, Topographic Center, Bethesda, Md. 20315

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National Oceanic and Atmospheric Administration, Rockville, Md. 20852

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Office: Room 316, North Bethesda Office Center II, 5640 Nicholson Lane, Rockville, Md. 20852
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Representative for the University: Edward B. Wright
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Naval Graduate Dental School, Bethesda, Md. 20014

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Office: Building 122
Telephone: 295-0064
Representative for the University: Edward B. Wright
Telephone: 676-7024
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Naval Ship Research and Development Center, Annapolis, Md. 21402

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Parklawn Building, Rockville, Md. 20852

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Representative for the University: Frank Dulong
Telephone: 676-7029

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Prince Georges Center Building (Naval Ships Engineering Center), Hyattsville, Md. 20788

Education Director: Doris B. Moore
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Representative for the University: Douglas H. Carter
Telephone: 676-7022
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Social Security Administration, Baltimore, Md. 21235

Director, Center for Continuing Education: Eric Levi
Office: Room 4-L-11, Annex Building, Division of Training and Career Development, 6401 Security Boulevard
Telephone: (301) 594-4529
Representative for the University: Frank Dulong
Telephone: (202) 676-7029
Open to employees of the Social Security Administration and to others by permission

Suitland Federal Complex, DMA-Hydrographic Center, Suitland, Md. 20390

John Rea, Head, Training Branch
Office: Main Building, Room 140
Telephone: 763-1357
Representative for the University: Edward B. Wright
Telephone: (202) 676-7024

Westinghouse Defense and Electronic Systems Center, Baltimore, Md. 21203

Manager, Education and Technology Training: Stanley F. Black
Office: Baltimore-Washington International Airport, Box 1693
Telephone: (301) 765-4447
Representative for the University: Frank Dulong
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Employee Development Locations Served:

1. Ballston Towers #2, Room 1111, 692-4476
2. Jefferson Plaza #2, Room 158, 692-8524

3. Crystal Mall #3, Room 817, Patricia McGinnis, 697-4530
4. National Center #3, Room 4E66, Alex Lathers, 692-5610

Representative for the University: Michael G. O'Connor
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Computer Sciences Corporation, 6565 Arlington Blvd., Falls Church, Va 22042

Director, Industrial Relations: Dennis Sheehy
Representative for the University: Herbert K. Berthold
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Defense Supply Agency, Cameron Station, Alexandria, Va. 22314

Education Director: Philip C. Strang, Chief, Employee Development Branch
Office: Room 8A111
Telephone: 274-7493
Representative for the University: William C. Robinson
Telephone: 676-7064
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Fairfax County Government, Fairfax, Va. 22030

Employee Training and Development Supervisor: Beverly Scott
Office: Personnel Office, 10409 Main Street, Fairfax, Va.
Telephone: 691-3437
Representative for the University: Gerry Bassett
Telephone: 676-7063
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Fort Belvoir, Va. 22060

Education Director: Eric Eber
Office: Building T-1483
Telephone: 664-3154 or 664-4546
Representative for the University: Michael G. O'Connor
Telephone: 676-7023
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Education Director: Robert L. Ayers
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Telephone: 692-1460
Representative for the University: Elisabeth P. Clarkson
Telephone: 676-7026
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Hoffman Building, 2461 Eisenhower Avenue, Alexandria, Va. 22314

Education Director and Chairman of the Department of Defense Education and Training Advisory Council: Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 697-8015 or 697-2823

Building Administrator: John Rice
Office: Room 124, Hoffman Building
Telephone: 325-0150
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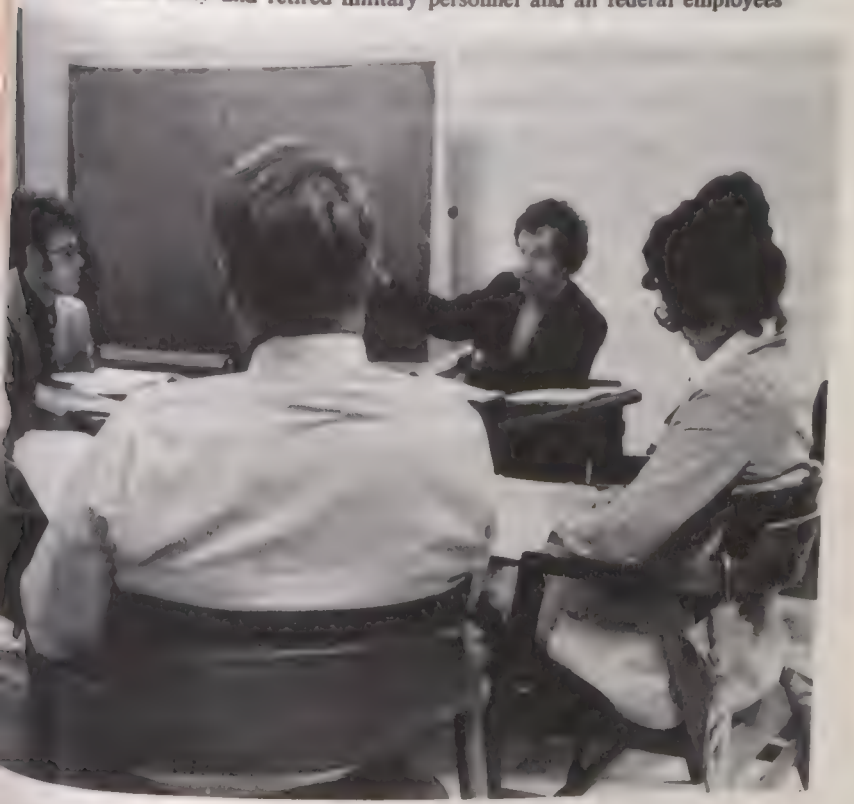
HQ., Army Materiel Command, AMC Building, 5001 Eisenhower Avenue, Alexandria, Va. 22304

Representative for the University: William C. Robinson, Room 3C155, Pentagon
Telephone: (Pentagon) 697-3141
(University) 676-7064

Nassif Building, 5611 Columbia Pike, Falls Church, Va. 22041

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Representative for the University: William C. Robinson
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The Pentagon, Washington, D.C. 20310

Director of the Pentagon Education Center, Chairman of the Armed Forces Educa tion and Training Advisory Council, and Education Officer for the U.S. Army
Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 697-2823 or 697-6805 or 697-8015

U.S. AIR FORCE

Education Officer: Edwin Corbin
Office: Room 5E410, Pentagon
Telephone: 697-1863 or 697-7074
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Pentagon Telephone: 697-3141
University Telephone: 676-7064
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Education Officer: Maurice Reed, Assistant to the Chief
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Representative for the University: Herbert K. Berthold
Telephone: 676-7014

Washington National Airport (FAA), Washington, D.C. 20001

Planning Development and Education Officer: William E. Freeman, Education and Training Office
Office: FAA Offices, Balcony, Main Terminal Building
Telephone: 557-2860 or 628-8781
Representative for the University: Elisabeth P. Clarkson
Telephone: 676-7026

Westgate/Westpark, Rt. 123 Tyson's Corner, McLean, Va. 22101

Representative for the University: Herbert K. Berthold
Telephone: 676-7014

West Springfield High School, 6100 Rolling Road, Springfield, Va. 22150

Representative for the University: Gerry Bassett
Telephone: 676-7063
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OFF-CAMPUS LOCATIONS OF EDUCATION COURSES FOR TEACHERS

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James T. Guines, Associate Superintendent of Instructional Services
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Telephone: 737-1062

Representative for the University: William C. Shelton, Sr.
Telephone: 676-7067

Charles Tri-County Center, Waldorf, Md. 20601

Maurice Dunkle, Program Counselor
Office: Thomas Stone High School
Telephone: (301) 843-6461
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

CALVERT COUNTY PUBLIC SCHOOLS, PRINCE FREDERICK, MD. 20678

David L. Brown, Supervisor of Personnel
Office: Calvert County School Board, Dares Beach Road
Telephone: (301) 535-1700

CHARLES COUNTY PUBLIC SCHOOLS, LA PLATA, MD. 20646

Elwood M. Leviner, Director of Personnel
Office: Charles County Board of Education, Health and Education Building
Telephone: (301) 934-4671

ST. MARY'S COUNTY PUBLIC SCHOOLS, LEONARDTOWN, MD. 20650

Kenneth D. Rigby, Assistant in Personnel
Office: St. Mary's County School Board of Health Building
Telephone: (301) 475-9141

Dorchester County Public Schools, Cambridge, Md. 21613

John T. Comer, Assistant Superintendent for Personnel
Office: 403 High Street
Telephone: (301) 228-4747
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Frederick Community College, Frederick, Md. 21701

Dr. Patrick Christoff, Dean, Office of Community Services
Telephone: (301) 662-0101
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Prince Georges County Public Schools, Upper Marlboro, Md. 20870

Maurice Erly, Acting Director of Staff Development and In-service Training
Office: Prince Georges County School Board
Telephone: 627-4800, Extension 218
Representative for the University: Anne O. Currier
Telephone: 676-7249

Talbot County Public Schools, Easton, Md. 21601

William F. Best, Assistant to the Superintendent
Office: Washington and Dover Streets
Telephone: (301) 822-0330

Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Wicomico County Public Schools, Salisbury, Md. 21801

William T. Middleton III, Director of Personnel
Office: Long Avenue and Mount Herman Road
Telephone: (301) 742-5128
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

VIRGINIA

Fairfax County Public Schools, Fairfax, Va. 22150

William C. Symons, Jr., Staff Development Officer
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Telephone: 691-3209
Representatives for the University: Gerry Bassett,
Telephone: 676-7249; John A. Morrow, Telephone: 676-7063

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George Washington University Tidewater Center: James Noel, Director
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Fort Eustis, Va. 23604

Education Director: Michael A. Yannitello
Telephone: (804) 878-5508

Fort Lee, Va. 23801

General Education Director: William Brantley
Telephone: (804) 734-2605

Fort Monroe, Va. 23351

Education Director: William R. Foley
Telephone: (804) 727-2454

Fort Story, Virginia Beach, Va. 23459

Education Director: E.F. Bolick
Telephone: (804) 422-7151

Guided Missile School/Fleet Anti-Air Warfare Training Center, Dam Neck, Virginia Beach, Va. 23461

Educational Adviser: William Eberling
Telephone: (804) 425-4473
Educational Director (Base): CWO2 R.E. Sorensen
Telephone: (804) 425-4184

Langley Air Force Base, Va. 23365

Education Services Officer: Robert J. Dewey
Telephone: (804) 764-5757

NASA-Langley Research Center, Langley Field, Hampton, Va. 23365

Head, Training and Education Services Branch: Malcolm P. Clark
Telephone: (804) 827-2611

Naval Air Station, Norfolk, Va. 23511

Educational Services Officer: Lt. J. McGalin, USN
Telephone: (804) 444-3291

Naval Air Station, Oceana, Virginia Beach, Va. 23460

Educational Services Officer: Lt. j.g. Amy Settle, USN
Telephone: (804) 425-2613

Naval Amphibious Base, Little Creek, Norfolk, Va. 23521

Educational Services Officer: Lt. j.g. Betsi Jones, USN
Telephone: (804) 464-7811

Naval Supply Center, Norfolk, Va. 23512

Training Director: George Green
Telephone: (804) 444-4912

U.S. Atlantic Fleet, U.S. Naval Base, Norfolk, Va. 23511

Educational Services Officer: Lt. j.g. D.K. Gibson
Telephone: (804) 444-6945

U.S. Naval Regional Medical Center, Portsmouth, Va. 23708

Training Officer: Eugene Rogers
Telephone: (804) 397-6541, Extension 561

U.S. Naval Station, Norfolk, Va. 23511

Educational Director: Lt. Isabelle Long, USN
Telephone: (804) 444-7272

COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES OF THIS CATALOGUE, under the alphabetically arranged names of the departments of instruction, are listed the courses of instruction. Courses carrying the designation "Campus Course" are normally offered only on campus. The courses are subject to change. The University reserves the right to withdraw any course announced.

EXPLANATION OF COURSE NUMBERS

COLLEGES AND SCHOOLS OTHER THAN ENGINEERING AND APPLIED SCIENCE

First-group courses.—Courses numbered from 1 to 100 are planned for students in the freshman and sophomore years. With the approval of the adviser and the dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisite to advanced courses, but they may not be credited toward a higher degree.

Second-group courses.—Courses numbered from 101 to 200 are planned for students in the junior and senior years. Except for Accounting courses they may be taken for graduate credit only upon the approval of the dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work in order to receive graduate credit.

Third-group courses.—Courses numbered above 200 are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are not open to other undergraduates. Qualified seniors registering for Accounting, Business Administration, Health Care Administration, Management Science, or Public Administration courses must have a 3.00 average, the prior approval of the department chairman who is responsible for the graduate course, the prior approval of the faculty adviser, and the prior approval of the Dean of the School of Government and Business Administration. Nondegree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Courses numbered from 1 through 199 are planned for undergraduate credit, although certain courses may be taken for graduate credit when arrangements are approved in advance by the instructor and the Dean. Courses numbered 201 to 300 are planned for graduate credit and may in certain instances be taken by qualified undergraduate students. Courses numbered from 301 to 400 are primarily for doctoral students.

SEMESTER HOURS OF CREDIT

The number of semester hours of credit given for the satisfactory completion of a course is, in most cases, indicated in parentheses after the name of the course. Thus, a year course giving 3 hours of credit each semester is marked (3–3), and a semester course giving 3 hours of credit is marked (3). A semester hour usually consists of the completion of one fifty-minute period of class work or of one laboratory period a week for one semester.

ABBREVIATIONS

The following abbreviations are used by George Washington University for course designations.

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anes	Anesthesiology
Anth	Anthropology
ApSc	Applied Science
Art	Art
ArTh	Art Therapy
Bioc	Biochemistry
BISc	Biological Sciences
BAd	Business Administration
Cart	Cartography
Chem	Chemistry
CH&D	Child Health and Development
Chin	Chinese
CE	Civil Engineering
Clas	Classics
ClEn	Clinical Engineering
CSci	Computer Science
Derm	Dermatology
Econ	Economics
Educ	Education
EPol	Education Policy
EE	Electrical Engineering
EAd	Engineering Administration
EFL	English as a Foreign Language
EngS	Engineering Science
Engl	English
Envr	Environmental Studies
Hum	Experimental Humanities
ForS	Forensic Sciences
Fren	French
Gnet	Genetics
Geog	Geography and Regional Science
Geod	Geodesy
Geol	Geology
Geop	Geophysics
Germ	Germanic Languages and Literatures
HCA	Health Care Administration
HCS	Health Care Sciences
Hist	History
HKLS	Human Kinetics and Leisure Studies
Idis	Interdisciplinary Courses
Ital	Italian
Japn	Japanese
Jour	Journalism
Law	Law
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineering
M&PA	Medical and Public Affairs
Med	Medicine
Micr	Microbiology
Mus	Music
NSur	Neurological Surgery
Neur	Neurology
Ob&G	Obstetrics and Gynecology
Ocea	Oceanography
OR	Operations Research
Opth	Ophthalmology
Orth	Orthopaedic Surgery

Otol	Otolaryngology
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
Phys	Physics
Phyl	Physiology
PSc	Political Science
Port	Portuguese
Pchi	Psychiatry and Behavioral Sciences
Psyc	Psychology
PAd	Public Administration
Rad	Radiology
Rel	Religion
SHum	Service-Learning Experimental Humanities
SPSc	Service-Learning Political Science
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
SpEd	Special Education
SPDR	Speech and Drama
Stat	Statistics
Surg	Surgery
TCom	Telecommunication Operations
U&RP	Urban and Regional Planning
Urol	Urology
WStu	Women's Studies



Accounting

Chairman: A.J. Mastro, Professor of Accounting; Government 302, Telephone 676-6055

Accounting courses numbered below the 200 level may not be taken for graduate credit. Accounting courses numbered 200 and above may not be taken for undergraduate credit.

1–2 Introductory Accounting (3–3)

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communication of significant economic and financial data. Prerequisite to Acct 2: Acct 1. Students who have received credit for a similar financial accounting course cannot receive credit for Acct 1.

101 Cost and Budgetary Control (3)

Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 215 cannot receive credit for Acct 101.

111 Financial Statement Analysis (3)

The analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2.

115 Financial Accounting (3)

(Formerly Survey of Financial Accounting)

Role of accounting in the decision-making of external parties; understanding, interpretation, and implementation of financial accounting. Students who have received credit for a similar financial accounting course cannot receive credit for Acct 115.

121 Intermediate Accounting (3)

In-depth study of accounting functions and basic theory: acquisition of assets and services, income and equity accounting, preparation and analysis of financial statements. Prerequisite: Acct 1–2.

132 Accounting Theory (3)

Current thought as reflected in the pronouncements of leading professional and accounting research associations, major contributions to accounting literature. Prerequisite: Acct 121.

141 Governmental Accounting (3)

Appropriation, encumbrance, and fund accounting for governmental and institutional entities. Prerequisite: Acct 1–2.

144 Federal Accounting (3)

Accounting procedures in the federal government, with emphasis on agency-level accounts and accounting support for cost-based budgets. Prerequisite: Acct 141.

161 Federal Income Taxation (3)

Federal income tax concepts applicable to individuals and corporations, differences between tax accounting and financial accounting.

171 **Auditing** (3)

Principles and procedures of auditing: generally accepted auditing standards, internal control, audit objectives and reports, form-preparation-use of audit work papers, audit evidence. Prerequisite: Acct 121.

181 **Accounting Systems** (3)

Organization and use of accounting information: origination, classification, control, and reporting; development, design, and installation of accounting systems; accounting communication patterns. Prerequisite: Acct 101, 171.

191 **Advanced Accounting** (3)

Application of accounting theory to special areas: consolidated statements, business combinations, earnings per share, foreign exchange, price-level adjusted statements, source and application of funds. Prerequisite: Acct 121.

193 **Business Budgeting** (3)

Principles and procedures in the development, installation, and operation of a system of budgetary control to aid management. Prerequisite: Acct 1–2. Students who have received credit for Acct 101 cannot receive credit for Acct 193.

215 **Management Accounting** (3)

(Formerly Survey of Managerial Accounting)

Role of accounting in management decision-making processes; understanding of accounting influences on resource allocation decisions in the organization. Prerequisite: Acct 115 or a similar financial accounting course. Students who have received credit for a similar management accounting course cannot receive credit for Acct 215.

231 **Contemporary Accounting Theory** (3)

Accounting principles and concepts and recent theories concerned with the valuation and amortization of assets and determination of income. Prerequisite: 6 semester hours of accounting.

241 **Accounting and Related Disciplines** (3)

Interrelationships of accounting and behavioral sciences, economics, mathematical methods, operations research. Prerequisite: 6 semester hours of accounting.

262 **Business Income Taxation** (3)

Federal income tax concepts applicable to corporations, partnerships, and their owners; emphasis on tax planning factors in business decisions and tax research.

275 **Contemporary Auditing Theory and Procedures** (3)

Study of auditing concepts: generally accepted auditing standards, application of statistical sampling to auditing, audit of electronic data processing systems. Prerequisite: Acct 115 and 215, or equivalent.

276 **Management Planning and Control** (3)

Integrative case study approach to management systems for planning, control, and decisions: value indices for organizational sub-units, transfer pricing, contemporary control systems, accounting framework and cycle. Prerequisite: Acct 115 and 215, or equivalent.

282 **Accounting Information Systems** (3)

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 115 and 215, or equivalent.

296 **Seminar in Accounting** (3)

Selected accounting studies: critical analysis and evaluation developed in seminar discussions and papers. Prerequisite: Acct 115 and 215, or equivalent.

American Civilization*

Director: B.M. Mergen, Associate Professor of American Civilization, P-101, Telephone 676-6070

71–72 **Introduction to American Civilization** (3–3) (Campus Course)

Themes and issues in American civilization since colonial times, with emphasis on their contemporary importance.

†192 **The American Cinema** (3)

History and criticism of American films. The course will enable the student to develop an ability to see and evaluate cinema techniques, to express the evaluation clearly in writing, and to understand the role of films in the context of American culture.

‡197 **Oral History and Interview Techniques** (4)

Introduction to theory and practice of obtaining and using historical data through recorded interviews. Examination of major published works in oral history. Particular attention to ongoing oral history projects in the Washington area.

226 **Ethnic Identity and the Melting Pot** (3)

An approach to understanding American civilization through the study of some of its ethnic and racial groups. The approach will be interdisciplinary, using historical, literary, and sociological materials.

271 **Seminar: Scope and Methods in American Studies** (3)

(Formerly Seminar: Research and Teaching in American Civilization)

Consideration of American studies as an area for research and teaching; introduction to bibliography.

Anthropology

hairman: R.L. Humphrey, Jr., Associate Professor of Anthropology; X-11, Telephone 676-6075

dministered by the American Studies Program.
oint offering of the American Studies Program and the department of speech and drama.
oint offering of the American Studies Program and the department of history.

Departmental prerequisite: Anth 1–2 is prerequisite to all other courses in A thropology except Anth 158 and 162. This prerequisite may be waived by permi sion of instructor.

1–2 Introductory Anthropology (3–3)

Anth 1: survey of man's origin, physical evolution, and culture histor Anth 2: survey of the world's cultures, illustrating the principles of cu tural behavior.

154 Mythology and Folklore (3)

Traditional verbal expression of supernatural or social beliefs; metaphorica thought; verbal art.

155 Primitive Religion (3)

Conceptions of the supernatural in nonliterate societies. Examination o religious beliefs and practices. Emphasis on religious process and change

157 Primitive Social Organization (3)

The analysis of the social organization of primitive peoples; kinship, eco nomic, and political systems.

171 Native Peoples of North America (3)

Comparative study of Indian groups representative of each of the culture areas of the continent.

185 Latin American Archaeology (3)

The culture history of pre-Columbian Latin America from the Paleo-Indian period through the Spanish Conquest, emphasizing the origin and development of Latin American high civilizations.

201 Seminar: the Nature and Scope of Anthropology (3)

Survey of the development of anthropological thought; examination of the subject matter, methodology, and theoretical approaches of anthropology, especially as they relate to contemporary societies.

202 Seminar: Recent Trends in Anthropology (3)

Major topics of interest in contemporary anthropology since the mid-20th century will be taken up in order, stressing current journal and mono graph materials.

Art

Chairman: W.A. MacDonald, Professor of Art and Archaeology; Building H, 2000 G Street N.W., Telephone 676-6085

31–32 Survey of Western Art (3–3)

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art. Art 31: prehistory to Gothic art. Art 32: proto-Renaissance to contemporary art.

71–72 Introduction to the Arts in America (3–3)

Painting, sculpture, and architecture of America, with selected reference to crafts and popular arts. Art 71: from colonial beginnings to the re publican age. Art 72: from early 19th century to the present.

109 **19th Century Art in Europe** (3)
Painting and sculpture.

110 **Contemporary Art** (3)
Painting and sculpture in 20th century Europe.

112 **Art of Egypt and the Ancient Orient** (3)
Study of the art of Mesopotamia, Anatolia, Egypt, and Persia.

113 **Baroque Art in Italy** (3)
Development of painting, sculpture, and architecture in 16th and 17th century Italy.

115 **Christian Iconography** (3)
Origins and development of Christian symbols and themes from early Christian to modern times.

117 **Medieval Art I** (3)
Architecture, sculpture, and painting of the early Christian and Byzantine periods.

120 **Art of China and Japan** (3)
Architecture, painting, and sculpture of China, Korea, and Japan.

129–30 **Principles of Museum Work** (3–3)
(Formerly Art 146 [3])
Introduction to the history and development of museums; problems of museum administration, connoisseurship, cataloguing, installation, conservation, and educational service.

141 **Interior Design** (3)
(Formerly Interior Decoration)
Principles of decoration dealing with furniture designs and ensemble layout, draperies, color, accessories, and lighting.

145 **Folk Arts in America** (3)
Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts.

155 **Etruscan Art and Archaeology** (6)
Art and Archaeology program in Italy.

156 **20th Century American Art** (3)
An examination and study of the wide range and variety of artistic expression in American painting, sculpture, and architecture from the late 19th century to the present. Given in conjunction with New York University Sunrise Semester program via TV. Off-campus credit only; credit not applicable to campus degree programs.

203 **Primitive Art** (3)
Arts of prehistoric and primitive man in Europe, pre-Columbian Americas, Oceania, and Africa.

242 **Etruscan Art and Archaeology** (6)
Art and Archaeology Program in Italy.

Biological Sciences

Chairman: A.H. Desmond, Professor of Zoology; Bell 314, Telephone 676-6090

BIOLOGY

3–4 **Introductory Biology for Nonscience Majors** (3–3) (Campus Course)
Lecture (2 hours), laboratory (2 hours). Survey of biological principles emphasis on man as a functional organism in his environment. Prerequisite to BiSc 4: BiSc 3. Material fee, $15 a semester.

11–12 **Introductory Biology for Science Majors** (4–4) (Campus Course)
Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Required of all prospective biology, botany, and zoology majors. Prerequisite to BiSc 12: BiSc 11. Material fee, $18 a semester.

Business Administration

Chairman: Guy Black, Professor of Business Economics; Government 302, Telephone 676-7139

51 **Introduction to Business** (3)
Structure, activities, and problems of business enterprise; its contribution to the individual and to society; careers in business.

101 **The Business Environment** (3)
Economic and legal environment of business enterprise; social and political influences; contemporary problems and issues.

102 **Fundamentals of Management** (3)
Planning, organizing, directing, coordinating, and controlling activities of the administrative unit; evolution of management thinking.

105 **Personnel Management** (3)
The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities.

106 **Leadership in Personnel Management** (3)
A study of the philosophy, principles, policies, and programs for effective personnel management and industrial relations as portrayed by case studies drawn from business and government. Prerequisite: BAd 105 or permission of insctructor.

107 **Collective Bargaining** (3)
American unionism and collective bargaining; economic, social, and public policy considerations. The negotiation and administration of collective bargaining agreements. Prerequisite: BAd 105 or permission of instructor.

113 **Real Estate** (3)
Principles of urban real estate practice; leasing and property management valuation, appraisal, financing, taxation, urban growth, urban renewal.

121 **Fundamentals of Insurance and Risk Management** (3)
Function of insurance and risk management in business enterprise.

122 **Insurance and Estate Planning** (3)

Insurance and estate programming in providing protection and estate development; disposition of the individual estate.

131 **Business Finance** (3)

Analyzing capital requirements and methods of acquiring funds; planning efficient use of capital. Asset management, financial analysis, sources of funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51.

132 **International Business Finance** (3)

Principles, practices, problems, and institutions of international finance. Emphasis on international financial markets, exchange rates, balance-of-payments restraints, and governmental policies. Prerequisite: BAd 131.

138 **Investment and Portfolio Management** (3)

Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2, BAd 131.

141 **Basic Marketing Management** (3)

Role of marketing in the socioeconomic system, consumer behavior analysis, impact of consumerism. Major decision areas of product planning, pricing and distribution; tools of marketing research and demand analysis. Prerequisite: Econ 1–2.

143 **Marketing Research** (3)

Basic methods and techniques of marketing research, problem definition, data collection, market survey and experimental design, data analysis and presentation. Special topics: attitude research, questionnaire construction and concept testing. Prerequisite: BAd 141.

158 **Physical Distribution Management** (3)

Logical considerations of plant, warehouse and store location, inventory control, warehousing and transportation planning. Channels of distribution from an institutional-behavioral viewpoint. Design, management and evaluation of the distribution system. Prerequisite: Econ 1–2.

161 **Commercial Law** (3)

Fundamental concepts and principles of law encountered in business activity; contracts, bailments, agency, sales, negotiable instruments, bankruptcy, other topics. Basic legal considerations in business decision-making.

171 **Principles of Transportation** (3)

Impact of intercity transportation systems on society. Emphasis on modal differences in development, economic characteristics, and regulation. Prerequisite: Econ 1–2.

172 **Public Utilities** (3)

Legal and economic meaning of public utility concept; development, services, economic characteristics, rate-making, and regulation with emphasis on electric, gas, and telephone industries. Prerequisite: Econ 1–2.

173 **Transportation Systems Management** (3)

Comparative study, from the standpoint of various carrier modes, of man-

agement problems common to all modes of domestic and international transportation. Prerequisite: BAd 171, Econ 1–2.

174 Urban Transportation (3)

Problems of developing balanced transportation systems for urban areas—area needs, modal evaluation, cost effectiveness, finance, and marketing. Prerequisite: BAd 171, Econ 1–2; or equivalent.

175 Introduction to International Business (3)

Terminology; trade usages and practices; physical movement of goods in international business; conditions essential for successful trading; export shipment, documentation, procedural problems.

178 International Business Policy and Operations (3)

Analysis of overseas projects according to purpose and type of organization; development and management of overseas operations in different world areas. Prerequisite: BAd 175 or permission of instructor.

181 Manufacturing Production (3)

Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from various process and fabrication industries. Prerequisite: Math 51, 52; Stat 51 or equivalent.

198 Business Policy and Administration (3)

Terminal undergraduate course in Business Administration. Integration of functional activities in arriving at over-all business policy decisions. Prerequisite: BAd 102, 105, 131, 141, 181.

202 Business-Government Relations (3)
(Formerly Relations of Government to Business)

Regulatory and promotional activities of the government, independent regulatory agencies, antitrust activities, monetary and fiscal policy, regulation of labor-management relations.

208 Personnel Management and Industrial Relations (3)

Survey of personnel management practices and procedures, including labor-management relations.

209 Seminar: Personnel Management (3)

Industrial personnel and manpower management, research in advanced problems.

211 Leadership and Executive Development (3)

Theories of managerial leadership; issues and problems associated with leadership in large organizations and at higher management levels; executive selection and development. Prerequisite: Mgt 201 or permission of instructor.

212 Unionism and Collective Bargaining (3)

The American labor movement. Collective bargaining and the conduct of labor relations under collective bargaining agreements.

213 Current Issues in Unionism, Collective Bargaining, and Labor Relations (3)

Current problems and issues. Prerequisite: BAd 212.

220 **Administration of Research and Development** (3)

Examination of technological, political, and economic factors affecting the R&D environment; operational aspects; management problems in military, governmental, and industrial organizations; project selection, resource allocation, personnel, planning and control, measurement and evaluation.

222 **International Research and Development** (3)

Technological, political, social, and economic factors affecting international R&D policy; problems in industrial, governmental, and international organizations; world technological forecasting; resource allocation; technology transfer. Prerequisite: BAd 220 or permission of instructor.

223–24 **Technology Assessment Theory and Practice** (3–3)

BAd 223: the technology assessment concept. Methods for conducting assessments. Management of assessments. Evaluation of selected assessments. BAd 224: planning and conducting a technology assessment. Prerequisite to BAd 224: BAd 223 or permission of instructor.

225 **Seminar: Manufacturing Production** (3)

Production technology, including new processes, materials, products, equipment, and facilities. Implications of emerging technology in managing the production function. Prerequisite: BAd 181 or permission of instructor.

229 **Seminar: Administration of Research and Development** (3)

Individual and/or group in-depth research projects dealing with various phases of research and development management. Topic will vary each time the course is offered according to the emerging technology, current operational problems, and student interest. Prerequisite: 6 to 9 semester hours of research and development management or permission of instructor.

231 **Financial Decision-making** (3)

Functions and objectives of financial management, asset management, problems of internal financial analysis, rate-of-return analysis, financial forecasting, problems of capital demand and supply. Prerequisite: Acct 115 or equivalent, BAd 131.

232 **Capital Resource Management** (3)

Problems of capital acquisition, costs, rationing, structure; dividend policy. Prerequisite: BAd 231.

233 **International Business Finance** (3)

Analysis of problems in international business finance. Impact of the evolving international payments system on business. Prerequisite: BAd 131 or equivalent.

234 **Seminar: Capital Formation** (3)

Determinants of saving and investment, timing of corporate security issues, analysis of current capital market conditions. Prerequisite: BAd 131 or equivalent.

235 **Financial Management** (3)

Restricted to students in the Navy Graduate Financial Management Program. Problems of financial management; planning financial structure, obtaining and managing capital, issuing and placing securities, administering income, security arrangements. Prerequisite: Acct 215, Mgt 201.

237 Investment Analysis (3)

Risk-reward analysis of security investments including analysis of nation economy, industry, company, and market; introduction to portfolio ma agement; emphasis on theory and computer methods. Prerequisite: BA 131.

238 Seminar: Investment and Portfolio Management (3)

Portfolio management theory, application, and computer modeling. Inde pendent research on investment analysis and portfolio management wit emphasis on theory, cases, and computer applications. Prerequisite: BA 237.

241 Marketing Management (3)

Marketing management problems; market segmentation, product planning channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs.

243 Seminar: Marketing Research (3)

Research as an aid to decision-making and increased efficiency in market ing, marketing research process, critical appraisal of methods and results applications.

248 International Marketing (3)

Organization for international marketing, demand analysis, product de velopment and policies, marketing structure and trade channels, advertis ing and promotion problems and policies, pricing, and legal aspects. Effec tive international marketing strategy.

255 Multinational Corporations in the World Economy (3)

Business in the world economy; multinational corporations as economic, political, and social institutions; ownership and growth strategies, relation ships to other nations; national and international controls; future of the multinational corporation.

256 Seminar: International Trade (3)

Classical and modern concepts of international trade theory, instruments and institutions of trade policy, barriers to trade, preferential treatment and trading blocs, trends and issues.

257 Business Policy in the Multinational Firm (3)

International market entry and expansion; operating policies, procedures, and problems of multinational companies; developing executives for inter national business. Prerequisite: advanced Master's degree standing.

261 Applied Microeconomics (3)

Applications of economic theory and statistics to business decisions involv ing demand, production, cost, profits, investments, and inventories. Pre requisite: Econ 217, Mgt 203, Stat 111; or equivalent; or permission of instructor.

262 Applied Macroeconomics (3)

Use of economic theory and statistics in business forecasting; interpre tation of economic trends and developments; analysis of governmental economic policies. Prerequisite: Econ 218, Mgt 203, Stat 111; or equiva lent; or permission of instructor.

275 Seminar: Transportation (3)

Problems and special areas of interest in transportation. Prerequisite: BAd 171 or permission of instructor.

279 **Purchasing and Materials Management** (3)

Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics.

280 **Procurement and Contracting** (3)

Overview of procurement and contracting; emphasis on federal government buying policies, practices, and procedures.

282 **Government Contract Administration** (3)

Surveillance and management of contract performance. Measurement of progress; specification interpretation; quality assurance; changes, negotiation, and adjustment; financial considerations; property; terminations; regulatory and policy concerns. Prercquisite: BAd 280 or permission of instructor.

283 **Pricing and Negotiation** (3)

Scope and objectives of negotiated procurement; preparation, conduct, and recording of negotiations; analysis of cost, price, profit, investment, and risk; cost principles; incentives; relationship of contract type to work requirements; techniques of negotiation. Prerequisite: BAd 280 or permission of instructor.

285 **Systems Procurement and Project Management** (3)

Development and procurement of major systems. Project management and its impact on the procurement process. Procurement planning. Prerequisite: BAd 280 or permission of instructor.

295 **Research Methods** (3)

Same as Mgt 295 and PAd 295. Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings.

297 **Business Policy Formulation** (3)

Analysis of operational situations and policy issues. Developing and implementing solutions to managerial problems. Prerequisite: advanced master's degree standing.

299 **Thesis Seminar** (3) (Campus Course)

Examination of thesis standards, research philosophy and methodology.

300 **Thesis Research** (3)

Cartography*

ogram Adviser: Hyman Orlin, Professorial Lecturer in Geodesy, Cartography, and eanography, Telephone 676-6185 or 946-3557

1 **Cartography I** (3)

Introduction to the fundamental concepts and practical applications of cartography.

*filiated with the Department of Geography and Regional Science.

2 **Cartography II** (3)

Aerial photography, modern topographic and hydrographic mapping and charting, thematic maps, map reliability, planning and design and reproduction. Prerequisite: Cart 1 or permission of instructor.

103 **Introduction to Remote Sensing** (3)

Photo-interpretation—history and applications. Interpretation of topographic, vegetative, hydrologic, and man-made features. Civil and military applications. Prerequisite or concurrent registration: Geod 17 or permission of instructor.

104 **Photo-interpretation** (3)

Applications to urban planning and urban-industrial patterns. Use of satellite imagery and remote sensing data. Color aerial photographs and underwater photography. Prerequisite: Cart 103 or permission of instructor.

107 **Physiography** (3)

Development of physiographic concepts; the earth's crust, weathering, climate, and denudation; stream, shore, wind, and ice processes; glaciation; physiographic regions.

108 **Climatology** (3)

Causes for climate and weather, air mass movements, water mass movements, physical features of boundaries. Tropics, subtropics, humid and dry continentals, subarctics.

111 **Cartographic Techniques** (3)

Techniques and procedures, field methods, evaluation of source material, use of scribing and contact screens in color separation, shaded relief, and reproduction. Lectures and laboratory. Laboratory fee to be announced. Prerequisite: Cart 2.

112 **Advanced Cartography** (3)

Automated cartography, including computer-assisted map compilation, statistical mapping, automated color separation, and revision systems. Aerospace cartography. Prerequisite: Cart 111.

120 **Computer Mapping** (3)

Methods of quantitive computer mapping. Through practical computer exercises, techniques are applied to a variety of mapping situations. Laboratory fee for computer use, $60. Checks must be made payable to the Utility Network of America.

125 **Marine Cartography** (3)

Exploring the extended and imaginative symbology required to depict a visually opaque environment characterized by sparsity of data; the thermatic aspects of oceanographic mapping. Prerequisite: Cart 2.

130 **Techniques in Remote Sensing** (3)

Theory and applications. Instrumentation. Data management. Automatic and interactive data interpretation. Courses or experience in the natural and/or physical sciences recommended. Prerequisite: Cart 103 or equivalent experience.

140 **Introduction to Sensitometry** (3)

Construction of tone reproduction curves; optimization of photographic

presentation; evaluation of photo materials, equipment and systems. Prerequisites: Math 30, Phys 1 or comparable experience.

142 **Mechanics and Kinetics of the Photographic Process** (3)

Light, optics and photometry as applied to the photographic process; sensitometry and densitometry for quality control and assurance; density slicing; image enhancement; auto- and self-dodging; antivignetting masks.

Chemistry

Chairman: R.E. Wood, Professor of Chemistry, Corcoran 104, Telephone 676-6120

PHYSICAL SCIENCE

3–4 **Contemporary Science** (3–3) (Campus Course)

For nonscience majors. Lecture (2 hours), laboratory (3 hours). Contemporary topics from the physical sciences are integrated to introduce the nonscience major to the basic methods and achievements of physical science. Laboratory fee, $17 a semester.

5–6 **Contemporary Science** (4–4)

Nonlaboratory course for off-campus students only. Survey covering topics in contemporary science: population control, pollution, drugs, food additives, etc.

CHEMISTRY

8 **Physiological Chemistry** (2)

Chemical aspects of selected topics in human physiology. Does not satisfy either premedical or course requirements for the chemistry major. A chemistry elective for students in allied health sciences.

9 **General Chemistry** (4)

Same as Chemistry 11, for off-campus students only.

11–12 **General Chemistry** (4–4) (Campus Course)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $28 a semester.

201 **Environmental Science and Technology** (3)

Chemistry and physics of environmental pollution; emphasis on water and air pollution. Instrumental techniques and their limitations. Students present papers emphasizing chemical and physical aspects of an environmental pollutant.

Chinese*

irman: C. Shih, Professor of Chinese; Library 613, Telephone 676-7106

*gnistered by the Department of East Asian Languages and Literatures.

1–2 Beginning Mandarin Chinese, Level I (3–3) (Campus Course)
Classroom (3 hours), laboratory (1 hour). Fundamentals of gramm and pronunciation with graded reading and practice in writing. Prereq site to Chin 2: Chin 1. Laboratory fee, $17.50 a semester.

3–4 Beginning Mandarin Chinese, Level II (3–3) (Campus Course)
Classroom (3 hours), laboratory (1 hour). Continuation of grammar an spoken Chinese with more emphasis on the written language and readin Prerequisite to Chin 3: Chin 2 or equivalent. Prerequisite to Chin 4: Chi 3. Laboratory fee, $17.50 a semester.

Economics

Chairman: M.A. Holman, Professor of Economics; C-617, Telephone 676-6150

Departmental prerequisite: Except for Econ 217–18 and 220, Econ 1–2 is prerequisite to all other courses in Economics.

1–2 Principles of Economics (3–3)
Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1: macroeconomics; Econ 2: microeconomics.

101 Intermediate Microeconomic Theory (3)
Analysis of supply, demand, and pricing.

102 Intermediate Macroeconomic Theory (3)
Theories of national income determination and growth.

121 Money and Banking (3)
Nature of money, credit, commercial banking, and other financial institutions in the U.S. monetary system.

217–18 Survey of Economics (3–3)
For graduate students in fields other than economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived.

220 Survey of Principles and Issues in Economics (3)
Survey of economic theory and its application to contemporary economic problems. Departmental prerequisite waived.

237 Seminar: Economics of the Environment and Natural Resources (3)
Analysis of public policy problems relating to the environment and natural resources development and management.

Education

Chairman: Donald Linkowski, Associate Professor of Education; C-514, Telephone 676-6940

Departmental prerequisite: A degree from an accredited institution and adequate professional preparation are prerequisite to courses in Education numbered from 201 to 400.

112 **Educational Measurement** (3)

Basic measurement techniques: selection, administration and interpretation of standardized tests; test construction and statistical analysis of test results.

128 **Children's Literature** (3)

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development.

200 **Special Workshop in Education** (arr.)
(Formerly Educ 400)

Topics to be announced in *Schedule of Classes.* May be repeated for credit.

205–6 **The Curriculum** (3–3)

For experienced teachers. Educ 205: curriculum foundations and issues, comparison of curriculum patterns. Educ 206: curriculum development in subject areas, group consideration of student problems.

207 **Curriculum Materials** (3 to 6)

For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations.

208 **Human Development** (3)

Consideration of human development and behavior throughout the life span; emphasis on practical implications of relevant interdisciplinary research.

209 **Child Development** (3)

Interdisciplinary approach to child development and behavior. Practical implications of research in disciplines contributing to knowledge about childhood.

210 **Adolescent Development** (3)

Interdisciplinary approach to adolescent development and behavior. Practical implications of research in disciplines contributing to knowledge about adolescence.

212 **Quantitative Methods I: Introduction to Survey Measurement and Research** (3)
(Formerly Quantitative Methods I: Measurement)

Introduction to measurement techniques and research methodology. Emphasis on descriptive and elementary statistical principles as applied to educational measurement and research.

213–14 **History of Education** (3–3)

Educ 213: European backgrounds of American education. Educ 214: evolution of the American school system.

216 **Education of Slow-learning Children** (3)

Identification, nature, and needs of slow-learning elementary and junior high school children. Emphasis on diagnosis and treatment of learning difficulties.

1–2 Beginning Mandarin Chinese, Level I (3–3) (Campus Course)
Classroom (3 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 2: Chin 1. Laboratory fee, $17.50 a semester.

3–4 Beginning Mandarin Chinese, Level II (3–3) (Campus Course)
Classroom (3 hours), laboratory (1 hour). Continuation of grammar and spoken Chinese with more emphasis on the written language and reading. Prerequisite to Chin 3: Chin 2 or equivalent. Prerequisite to Chin 4: Chin 3. Laboratory fee, $17.50 a semester.

Economics

Chairman: M.A. Holman, Professor of Economics; C-617, Telephone 676-6150

Departmental prerequisite: Except for Econ 217–18 and 220, Econ 1–2 is prerequisite to all other courses in Economics.

1–2 Principles of Economics (3–3)
Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1: macroeconomics; Econ 2: microeconomics.

101 Intermediate Microeconomic Theory (3)
Analysis of supply, demand, and pricing.

102 Intermediate Macroeconomic Theory (3)
Theories of national income determination and growth.

121 Money and Banking (3)
Nature of money, credit, commercial banking, and other financial institutions in the U.S. monetary system.

217–18 Survey of Economics (3–3)
For graduate students in fields other than economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived.

220 Survey of Principles and Issues in Economics (3)
Survey of economic theory and its application to contemporary economic problems. Departmental prerequisite waived.

237 Seminar: Economics of the Environment and Natural Resources (3)
Analysis of public policy problems relating to the environment and natural resources development and management.

Education

Chairman: Donald Linkowski, Associate Professor of Education; C-514, Telephone 676-6940

Departmental prerequisite: A degree from an accredited institution and adequate professional preparation are prerequisite to courses in Education numbered from 201 to 400.

112 **Educational Measurement** (3)

Basic measurement techniques: selection, administration and interpretation of standardized tests; test construction and statistical analysis of test results.

128 **Children's Literature** (3)

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development.

200 **Special Workshop in Education** (arr.)

(Formerly Educ 400)

Topics to be announced in *Schedule of Classes.* May be repeated for credit.

205–6 **The Curriculum** (3–3)

For experienced teachers. Educ 205: curriculum foundations and issues, comparison of curriculum patterns. Educ 206: curriculum development in subject areas, group consideration of student problems.

207 **Curriculum Materials** (3 to 6)

For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations.

208 **Human Development** (3)

Consideration of human development and behavior throughout the life span; emphasis on practical implications of relevant interdisciplinary research.

209 **Child Development** (3)

Interdisciplinary approach to child development and behavior. Practical implications of research in disciplines contributing to knowledge about childhood.

210 **Adolescent Development** (3)

Interdisciplinary approach to adolescent development and behavior. Practical implications of research in disciplines contributing to knowledge about adolescence.

212 **Quantitative Methods I: Introduction to Survey Measurement and Research** (3)

(Formerly Quantitative Methods I: Measurement)

Introduction to measurement techniques and research methodology. Emphasis on descriptive and elementary statistical principles as applied to educational measurement and research.

213–14 **History of Education** (3–3)

Educ 213: European backgrounds of American education. Educ 214: evolution of the American school system.

216 **Education of Slow-learning Children** (3)

Identification, nature, and needs of slow-learning elementary and junior high school children. Emphasis on diagnosis and treatment of learning difficulties.

217–18 Philosophy of Education (3–3)

Educ 217: to help students formulate a personal philosophy of education. Educ 218: social foundations of education—forces that shape policies and offerings of the school.

219 Elementary School Classroom Procedures (3)

Current theories of teaching and learning and their application to teaching acts and strategies of elementary school teachers.

222 Foundations of Reading Instruction—Early Childhood (3)

Historical and psychological background; readiness, special approaches and skills for beginning readers; evaluation of materials; demonstrations of diagnostic and instructional techniques.

223 Foundations of Reading Instruction—Elementary and Secondary (3)
(Formerly Foundations of Reading Instruction)

Historical and psychological background; evaluation of recent methods, materials, and techniques in teaching reading; demonstrations of diagnostic and teaching techniques.

224 Diagnostic Teaching of Reading (3)

Classroom diagnostic and instructional techniques for elementary school levels; construction of informal tests; administration and interpretation of informal and standardized tests; study of materials and application of readability formulas. Prerequisite: at least one previous course in reading.

226 Reading in Secondary School and College (3)

Methods, techniques, and materials necessary for testing and developing efficient reading skills, including skills in content subjects; organizing and evaluating reading programs.

227 Basic Issues in Elementary Education (3)

Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school.

228 Instructional Areas in Elementary Education (3)

Current trends and research on reading, language arts, social studies, mathematics, science, music, art, and physical education.

229 Administration of Elementary Education (3)

For experienced teachers and administrators. Achieving instructional objectives, organizing and servicing teaching activities, coordinating school and community life.

231 Secondary School Classroom Procedures (3)

Current classroom practices: teacher-pupil planning, group procedures, initiatory and culminating activities, individual and group evaluation techniques, teaching aids, etc.; review of recent literature.

232 Supervision of Elementary Education (3)

For experienced teachers and administrators with two or more years of teaching experience. Review of modern supervisory concepts, including practices in the operation of the elementary school.

233 Audio-visual Education (3)

Lecture (2 hours), laboratory (1 hour). Selection, evaluation, and use of

audio-visual materials; administrative problems in care, operation, maintenance, and use of such materials and equipment. Material fee, $7.

235 **Analysis of Teaching** (3)

Teaching as work: diagnosing learning skills, program planning and implementation, feedback information on both student and program.

236 **Introduction to Education Technology** (3)

Consideration of historical perspective, process, instrumentation, and implementation of self-instructional systems.

237 **Systems Approach to Instructional Design** (3)

Application of systems techniques to the development of an instructional program.

241 **Education of the Gifted** (3)

For classroom teachers. Nature and discovery of giftedness, provisions for the gifted in regular classes, experimental projects.

243 **Human Relations in Education** (3)

Principles and practices in human relations between and among learner, teacher, other school personnel, and parents.

245 **School and Community** (3)

The school as an important member of a team of social agencies that builds the community.

247 **Adult and Preprofessional Technical and Occupational Education** (3)

Development, current concepts, agencies involved, problems, and trends in adult vocational-technical-occupational education in the United States and foreign countries.

250 **Counseling Drug Abusers** (3)

Counseling theory and practice applied to drug abusers. Crisis intervention, self-help groups, and family therapy; individual and group counseling.

251 **Foundations of Counseling** (3)

Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues.

252 **Organization and Administration of Guidance Services** (3)

Procedure and practice in organizing and administering school guidance and pupil personnel programs. Admission by permission of instructor.

253 **Individual Appraisal in Counseling** (3)

Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: Educ 112 or equivalent.

254 **The Middle School** (3)

Development, organization, and practices; emphasis on the learner, the teacher, the administrator, the curriculum, and the setting of the school for the preadolescent.

255–56 **Secondary Education** (3–3)

Examination of historical, psychological, sociological, and philosophical

bases; emphasis on prescriptive implications. Special attention to contemporary problems and practices.

257 **Career Development and Information** (3)
Theories of career development; factors influencing the world of work; procedures for evaluating and using socio-personal, educational, and occupational information.

258 **Theories and Techniques of Counseling** (3)
Theories and practices of vocational, educational, and personal counseling. Prerequisite: 12 semester hours in guidance and counseling, including Educ 253 and 257.

259 **Secondary School Administration** (3)
For experienced teachers and administrators. Survey of administration, including practices of the modern high school.

260 **Secondary School Supervision** (3)
For experienced teachers and administrators. Review of modern supervisory concepts, including practices in schools.

263 **Human Resource Development: Training and Education** (3)
Concepts and purpose, historical backgrounds, emerging roles of human resource development personnel, program areas. Prerequisite: adequate professional preparation or experience in training, education, and development.

264 **Design of Training Programs in Human Resource Development** (3)
(Formerly Program Planning in Human Resource Development)
Training, education, and development programs for various client systems will be planned using critical events conceptual model. Field work. Prerequisite: Educ 263 and permission of instructor.

269–70 **School Business Management** (3–3)
Educ 269: philosophy, responsibilities, and functions of the business management office in public education institutions. Educ 270: practicum in educational business management.

271 **The Teacher and School Administration** (3)
Role of federal, state, and local administrative units; school finance; legal controls; school plant; public support; improving teaching conditions.

272 **The Teacher and School Supervision** (3)
Nature, organization, human relationships, and techniques.

275 **Seminar: School Finance** (3)
Educational financial theory, practice, and control, including methods of financing.

276 **Seminar: Public Relations in School Administration** (3)
Purposes, gathering materials, disseminating agencies, publicity media, public participation in policy-making.

278 **School Law** (3)
Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group.

283 **Higher Education in the United States** (3)

History, scope, purpose, present status, programs and trends in higher education in the United States.

284 **Administration of Higher Education** (3)

Government, organization, and administration of colleges and universities; duties of trustees and administrators.

285 **Student Activities** (3)

Nature and purposes of selected activities—homeroom, clubs, assemblies, school publications, student council, interscholastic contest; attention to sponsorship, participation, finance, and evaluation.

291 **Planning the School Plant** (3)

Selection of sites; evaluation of existing buildings; utilization of present facilities; adaptation to curricular needs; building, operation, and maintenance problems.

295 **Quantitative Methods II: Research Procedures** (3)

Required of all candidates for graduate degrees in Education. Analysis of scientific approaches to problems in education; evaluation of research techniques. Prerequisite: Educ 112, 212; or equivalent.

297 **Personnel Administration** (3)

Organization and administration of personnel programs for educational institutions. Basic philosophy, principles, responsibilities, and functions.

298 **Seminar: Personnel Administration** (3)

Research: policies, rules and regulations, staff organizations, negotiations.

299–300 **Thesis Research** (3–3)

Required of M.A. in Ed. degree candidates writing Master's theses.

316 **Curriculum Developments in Elementary School Social Studies** (3 to 6)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor.

317 **Curriculum Developments in Elementary School Science** (3 to 6)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor.

320 **Curriculum Developments in Elementary School Mathematics** (3 to 6)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor.

324 **Teaching Reading and Study Skills at the College Level** (3)

Evaluation of reading skills at the college level. Development of college reading programs, including diagnostic and teaching techniques, program planning and implementation. Prerequisite: Educ 226, or equivalent and permission of instructor.

325 Curriculum Theory (3)

Examination of reviews and research studies in curriculum theory. Focus on trends, values, interpretations, fads, design systems and evaluation.

343 Advanced Studies in Human Development (3)

Review and consideration of classical and empirical research studies on selected topics in human development. Issues, instrumentation, and research needs in respect to each topic discussed. Admission by permission of the instructor.

353 Counseling Older Persons (3)

Special considerations and counseling emphasis on second careers, retirement adjustments, death and dying.

354 Counseling of Minority Groups (3)

Consideration of problems and approaches related to counseling cultural and racial minorities in American society; emphasis on counseling the disadvantaged in urban areas.

355 Counseling in Groups (3)

Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling.

357 Personal and Social Adjustment (3)

Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents.

358 Advanced Theories of Counseling (3)

Critical analysis and evaluation of leading counseling theories and consideration of their implications for practice. Intended for Education Specialist and Doctor of Education degree candidates whose area of concentration is counseling. Admission by permission of instructor.

370 College Students and Their Community (3)

Survey of literature on the characteristics, behavior, and attitudes of the contemporary college student; college student interaction with his environment. Admission by permission of instructor.

371 Principles and Practices in College Teaching (3)

General principles, methods, techniques, and experimental instructional media for teaching at the college and university level.

372 Internship in College Teaching (3 to 6)

Supervised experience in a selected area of college teaching. Prerequisite: Educ 371. Admission by permission of instructor.

373 The Community-Junior College (3)

The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges.

374 Current Issues in Higher Education (3)

Prerequisite: Educ 283, 284.

375 Foundations of a College Student Development Program (3)

College student development as an integral part of higher education programs.

380 **Sensitivity Training: Laboratory Method** (3)

A sensitivity learning experience in human relations using unstructured group experience, individual feedback, experimentation, and practice. Admission by permission of Department, prior to registration.

381 **Adult Learning** (3)

Learning theories as applied to adults in individual and group learning transactions; effect of age on learning; psychological, physical, and social environment in adult education situations.

382 **Instructional Strategies in Adult Learning Programs** (3)
(Formerly Methods and Techniques of Adult Learning)

Methods, techniques, and devices for adult learning; developing action-oriented learning situations in adult learning programs.

383 **Interviewing-Counseling for Human Resource Developers** (3)
(Formerly Counseling of Adults)

Applications of interviewing, coaching and counseling skills for the human resource development specialist and others in various occupational settings.

384 **Evaluation of Adult Learning Programs** (3)

Measurement and evaluation of adult learning programs in school and nonschool agencies—business, industry, government, voluntary organization, and community.

386 **Current Issues in Adult Learning Programs** (3)

For M.A. in Ed. degree candidates. Current issues and trends in the fields of adult education and human resource development. Admission by permission of instructor.

387 **Administration of Adult Learning Programs** (3)

Program administration, staff recruitment and development, fiscal operations, facilities, and maintenance of effective community relations.

389 **Consultant-Client Relationship in Human Resource Development** (3)

Examination of the consulting process, consultant-client behaviors, and dilemmas using theory and field experience for individual and organizational development. Prerequisite: Educ 264, 280 *Program Planning in Adult Education (3);* or approval of instructor.

390 **Legal Problems in Higher Education** (3)

Investigation of legal problems in higher education related to administration, students, faculty, and academic program.

391 **College and University Curriculum** (3)

Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum.

392 **Financing Higher Education** (3)

Analysis of private, state, and federal revenue sources; student aid, program budgets, and financial methods and practices.

393 **Practicum in Higher Education** (3 to 6)

Supervised field experiences in higher education; reports and conferences. Admission by permission of instructor.

394 **College and University Governance** (3)

Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 284.

395 **Problems and Practices in Educational Administrative Organization** (3 to 6)

Application of principles and practices concerned with change and evaluation of educational administration.

399 **Seminar: Applied Educational Administration** (3 to 6)

Application of the theories and principles of administration to the public schools. Student participation with guidance by recognized regional practitioners.

Engineering and Applied Science

Coordinator of NASA-Langley Graduate Program: S.W. Yuan, Professor of Engineering and Applied Science, Tompkins 118, Telephone 676-6749

Program Adviser of Naval Ship Research and Development Center, Carderock, Md.: J.E. Feir, Professor of Civil Engineering, Tompkins 109, Telephone 676-7526

Program Adviser of Naval Ship Research and Development Center, Annapolis, Md.: S.W. Yuan, Professor of Engineering and Applied Science, Tompkins 118, Telephone 676-6749

APPLIED SCIENCE

115 **Engineering Analysis III** (3)

Solution of engineering problems using concepts from probability and statistics, including random variables, distribution functions, mathematical expectation, point and confidence interval estimation, hypothesis testing, correlation, and regression. This methodology applied to problems of structural design, bioengineering, manufacturing processes, product quality, equipment reliability, engineering management, and societal engineering. Prerequisite: Math 32.

211 **Analytical Methods in Engineering I** (3)

Engineering applications of the theory of complex variables including contour integration, conformal mapping, inversion, integral and boundary-value problems. Prerequisite: approval of Department.

212 **Analytical Methods in Engineering II** (3)

Analytical methods appropriate to the formulation of engineering problems including finite dimensional vector spaces, eigenvalue problems, generalized Fourier series, tensor calculus, curvilinear coordinates. Prerequisite: approval of Department.

213 **Analytical Methods in Engineering III** (3)

Analytical techniques for solution of boundary-initial problems in engineering involving wave propagation, diffusion processes, and potential distributions. Prerequisite: approval of Department.

214 **Analytical Methods in Engineering IV** (3)

Introduction to variational methods in engineering including Ritz and Galerkin approximation methods for boundary-value problems. Aspects

of linear integral equations arising from engineering analysis. Prerequisite: approval of Department.

215 **Analytical Methods in Engineering V** (3)

Advanced methods in solution of boundary-initial value problems in engineering, including characteristics, wave propagation, and Green's functions. Prerequisite: ApSc 213.

216 **Special Topics in Engineering Analysis** (3)

Selected topics such as (1) perturbation techniques applied to approximate solution of nonlinear boundary and initial value problems in engineering; (2) application of singular integral equations in problems of mechanics; (3) applications of elements of functional analysis in engineering and science. Prerequisite: approval of Department.

CIVIL ENGINEERING

168 **Introductory Soil Mechanics** (3)

Engineering properties of soils; analysis of lateral earth pressures, bearing capacity, foundations, and slope stability. Prerequisite: CE 120 *Introduction to the Mechanics of Solids* (4) and ME 126 *Fluid Mechanics* (3).

191 **Metal Structures** (3)

Principles of the design of metal structures; structural elements; connections; specific problems of analysis; methods of construction. Prerequisite: CE 123 *Structural Theory* (6).

192 **Reinforced Concrete Structures** (3)

Principles of the design of reinforced concrete structures. Details of reinforcement of structural elements. Monolithic structures, precast elements, methods of construction. Prerequisite: CE 123 *Structural Theory* (6).

201 **Design of Metal Structures** (3)

Structural behavior of metal structures, conception and design of advanced structural components and systems, hysteretic behavior, plastic design principles, box type girders, cable systems, composite girders, and special topics. Prerequisite: CE 191 or equivalent.

202 **Design of Reinforced Concrete Structures** (3)

Structural behavior of reinforced concrete structures, conception and design of structural components, prestressed concrete, slabs, ultimate strength and deformation, box type girders, hysteretic behavior, safety considerations, and special topics. Prerequisite: CE 192 or equivalent.

203 **Prestressed Concrete Structures** (3)

Structural behavior and failure modes of prestressed concrete structures; design in prestressed concrete, including long-span structures, bridges, and precast systems. Prerequisite: CE 202 or equivalent.

206 **Foundation Engineering** (3)

Principles of soil mechanics and structural mechanics applied to the analysis and design of spread footings and mat foundations, pile foundations, retaining structures, including sheeting and bracing systems, and waterfront structures. Problems associated with subsurface exploration, dewatering excavations, and underpinning. Prerequisite: CE 204 *Applied Soil Mechanics I* (3) or CE 205 *Applied Soil Mechanics II* (3) or equivalent.

253 Failure and Reliability Analysis of Engineering Structures (3)

Operational and structural failure mechanisms; instability, fracture, and fatigue. Operational and structural safety, probability of failure. Aspects of probabilistic structural analysis, statistics of extremes, risk and reliability, optimal design criteria. Prerequisite: ApSc 115 or equivalent.

254 Special Topics in Structural Engineering (3)

Selected problems in structural mechanics and design: (1) thermal stresses in structural systems, (2) advanced probabilistic structural mechanics, (3) structural design for dynamic loads, (4) structural design for repeated loads, or (5) structural synthesis and optimization. May be repeated for credit. Prerequisite: CE 210 *Methods of Structural Analysis* (3), and approval of Department. Topic to annuonced in the *Schedule of Classes.*

255 Coastal Processes (3)

Longshore currents and nearshore circulation; coastal sediment properties and analysis, longshore transport processes and rates; sediment budget; response of beaches to wave action and structures; tidal inlets, mechanical bypassing; beach nourishment; wind transport of sandy dune stabilization, sediment tracing. Prerequisite: approval of Department.

258 Harbor and Coastal Engineering II (3)

Interaction between structures and waves. Analysis and design of flexible structures: piers, jetties, and protective structures; off-shore drilling platforms. Design criteria, moorings and cables, harbor operations equipment. Prerequisite: CE 252 *General Structural Dynamics* (3); CE 257 *Harbor and Coastal Engineering I* (3) or equivalent.

261 Analysis of Plates and Shells (3)

Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations, theory of folded plate structures. Theory of curved surfaces; general linear bending theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow shell theory. Specific applications. Prerequisite: graduate status.

263 Theory of Structural Stability (3)

General criteria for stability; buckling of elastic and inelastic columns and frames; torsional and lateral buckling; variational methods. Buckling of plates and shells under static loads; stability of stiffened structures; effect of imperfections and boundary conditions. Prerequisite: graduate status.

271 Theoretical Marine Hydromechanics (3)

Introductory course designed to acquaint the student with some physical concepts and mathematical tools of theoretical marine hydromechanics. Derivation of the fundamental equations and boundary conditions of a fluid media; application of potential-flow theory to fluid motion around two- and three-dimensional bodies; perturbation concepts. Introduction to thin-ship and slender-body theories. Derivation of force and movement of bodies moving in calm and disturbed water. Prerequisite: approval of Department.

274 Mechanics of Water Waves (3)

Irrotational theory for deep- and shallow-water waves, reflexion, refraction, diffraction, attenuation. Water waves of finite amplitude: shallow-water theory, tides, bores, long-waves theory, conoidal and solitary waves. Wave generation by wind; state-of-the-art based on correlation between

theory and measurements. Wave-breaking and reflexion. Prerequisite: ME 221 or equivalent and permission of instructor.

275 **Special Topics in Ocean Engineering** (3)
Selected topics: (1) marine aspects of viscous-flow theory, (2) interfacial (internal) waves, (3) applied random processes in ocean and coastal engineering, or (4) other selected topics. Prerequisite: approval of Department. May be repeated for credit.

COMPUTER SCIENCE

201 **Introduction to Computer Systems I** (3)
Introduction to programming digital computers in a macro-assembly language and higher-level procedural languages; techniques in machine control and memory addressing. Characteristics of different computer structures and the programming of such machines. Introduction to the structure of compiler languages; parsing of compiler language statements. Characteristics and choice of data processing language. Prerequisite: CSci or EE 51 *Applications of Computers* (3) or equivalent, assembly language programming experience, and permission of instructor.

202 **Introduction to Computer Systems II** (3)
Introduction to combinational and sequential logic networks; analysis and synthesis of switching circuits using Boolean algebra; minimization techniques in the design of logical circuits; number systems and arithmetic in digital computers, digital computer architecture and the design of functional sub-units; design of memory, arithmetic, and units comprising a digital computer; information flow, timing, and control in large digital computers. Prerequisite: CSci 201 or permission of instructor.

231 **Finite State Machines** (3)
Abstract algebraic foundations using set theory, including operators, relations, mappings, homomorphisms, lattices, and mathematical systems such as groups and semigroups. Sequential machine (finite state machines) theory including state representation and identification, Moore and Mealy machines, reduction and equivalence of completely and incompletely specified machines, partitions and covers, and composition and decomposition. Prerequisite: CSci 202 or CSci or EE 153.

237 **Computing Systems** (3)
Organization of large digital computer systems. Design of high-speed arithmetic units. Random access and associative memories; rotational storage devices; computer control and interrupt structures. Input-output channels and interfacing problems. Communications in digital computers. Introduction to multiple access and time-sharing systems. Prerequisite: CSci or EE 154 *Ditigal Computer Design* (3) or CSci 202.

263 **Digital Computer Programming Systems** (3)
Design of computer systems software. Use of a macro-assembler and job control language. Design of assemblers and loaders. Concepts of multiprogrammed job control including linking, loading, linkage-edit, relocatability, and status switching. Design of dispatchers and monitors. Communications between components of an operating system. Input-output programming and control. Design of utility programs. Prerequisite: CSci 214 *Data Structures* (3) or permission of instructor.

285 **Approximation of Functions and Data Representations** (3)
Review of linear spaces; least squares, orthogonal functions; nonlinear

techniques, gradient search methods; parameter estimation with discrete data; Tchebysheff approximation; approximation and curve fitting by Spline functions and Bernstein polynomials.

ELECTRICAL ENGINEERING

152 Introduction to Digital Computers (3)

Introduction to the use of structure of minicomputers and larger computers. Boolean algebra and the design of combinational switching circuits. Number systems, codes, and arithmetic operations in digital computers. Digital computer subsystems and their interconnections. Interfacing equipment to a minicomputer; timing, control, and electronic requirements. Introduction to programming analog computers; analog computer components; analog-to-digital conversion. Prerequisite: EE 157 *Machine and Assembly Language Programming* (3).

153 Design of Switching Systems (3)

Switching algebra and Boolean logic; sets, relations, and lattices. Analysis and design of switching devices; design of combinational logic networks. Minimization techniques and decomposition methods. Electronic implementation of logic; contact networks, symmetric functions, and threshold logic. Reliable design and fault-detection tests. Number systems and codes, geometric interpretation, error detecting and correcting codes; encoders and decoders. Logic and electronic design of functional digital units. Sequential circuits and iterative networks. Minimization and transformation of sequential machines; structure of sequential machines; partitions and covers. State identification and fault-detection experiments. Prerequisite: EE 152 or permission of instructor. May be taken for graduate credit.

201 Natural Modes and Transients in Electrical Systems (3)

Transient response and natural modes of electrical systems; techniques for analyzing systems with periodic and aperiodic inputs and outputs; sampling.

202 Linear System Theory I (3)

Graph theory and its application to networks and systems; system description in time and frequency domain; linear spaces and linear operators; mathematical representation of linear systems; analytical and computer solutions of the state equations; transient and steady-state response. Prerequisite: graduate status.

203 Linear System Theory II (3)

System properties; controlability and observability of linear systems; sensitivity and stability analyses. Irreducible realizations of rational transfer-function matrices; canonical forms, state feedback, and state estimators. Linear composite systems. Prerequisite: EE 202.

204 Stochastic Signals and Noise (3)

Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear mean-squared estimation; stationary estimation, stationary random processes, correlation functions, power spectrum; output of linear systems with stochastic inputs; Gaussian processes. Applications drawn for communications, control theory, computer science.

224 Quantum Electronics of Masers and Lasers (3)

Basic concepts from quantum mechanics; Einstein coefficients; inversion and pumping mechanisms; rate equations. Resonators. He-Ne laser; or-

ganic dye lasers; injection lasers. Nonlinear interactions in lasers. Prerequisite: EE 222 *Physical Electronics II* (3) or equivalent.

235 **Antennas** (3)

General solution of Maxwell's equations in terms of current sources, the far field approximations, radiation from current distributions, field equivalence theorems, the geometrical optics approximation, aperture antennas, receiving antennas, the theory of arrays, and applications to specific antennas and antenna types. Prerequisite: EE 207 *Electromagnetic Theory and Applications II* (3).

241 **Information Theory** (3)

Measure of information, noiseless coding; communication channels, channel capacity, the noisy channel coding theorem; bounds on the performance of communication system; the Gaussian and binary symmetric channel; feedback communications systems; rate-distortion theory. Prerequisite: EE 204.

242 **Coding Theory** (3)

Error-correcting codes; bounds on the performances of error-correcting codes, group codes; syndrome decoding; cylic codes, their encoding and decoding; Galois fields; BCH codes, burst correction, and threshold-decodeable codes; performance calculations. Prerequisite: EE 204.

243 **Communication Theory I** (3)

Optimum receivers for vector channels and for the additive white Gaussian noise channel; correlation detectors, matched filters; coherent and noncoherent detection and their error probabilities for simplex, orthogonal, and coded systems; bounds on the performance of communications in Gaussian noise; comparison of communications systems. Prerequisite: EE 204 or equivalent.

244 **Communication Theory II** (3)

Schemes for efficient signaling for data sequences; effects of quantizing at the receiver; detection of such signals in colored noise; detection of stochastic signals; the innovations approach in detection and estimation problems; signaling over fading channels and the optimum receivers; diversity techniques and their performances. Prerequisite: EE 243.

245 **Signal Detection and Estimation Theory** (3)

Statistical detection theory, hypothesis testing, sequential detection, estimation theory, maximum likelihood and Bayes methods, estimation of signal parameters and continuous wave forms, Wiener and Kalman filters, applications to the design of optimum receivers, adaptive systems. Prerequisite: EE 241, 244; or equivalent.

*250 **Telecommunication Systems Concepts** (3)

Essential elements of an electrical communication system, speech, TV, and data signals, spectrum, bandwidth, sampling. Amplitude, frequency and pulse code modulation and comparative performance. Multiplexing schemes, communication quality standards and objectives. Signal power, noise power, distortion, and channel capacity. Probability, traffic theory, reliability, voice, TV, and data transmission. Telecommunication, microwave radio, cable, and satellite communications systems.

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250 and 251 cannot be applied toward a graduate degree in the School of Engineering and ied Science.

***251 Survey of Telecommunication Systems (3)**

Design of a communications link for voice, TV, and data. Loading; the switched telephone network. Transmission system layout and major design considerations. Over-all system design of microwave radio system. Radiowave propagation fundamentals. Satellite communications, factors affecting the choice of orbit and orbital separation of satellites, satellite transponder. Major design consideration and values of significant parameters for a typical satellite communications link. Over-all design of a cable communication system. Digital transmission and digital terminals. Wideband data transmission. Frequency allocation.

273 System Optimization (3)

Parameter optimization problems; theory of minima and maxima. Optimization problems for dynamic systems; calculus of variations; the maximum principle and the Hamilton-Jacobi equation. Optimization problems with constraints; optimal feedback systems. Numerical solution of optimal problems. Prerequisite: EE 203 or equivalent.

274 Nonlinear Systems (3)

Definition of linear and nonlinear systems; introduction to approximate analysis of nonlinear systems—describing functions, Krylov and Bogoliubov's asymptotical method and Tsypkin's locus. Forced oscillations—jump resonance. Stability analysis—Liapunov's criterion, Luré's problem, and Popov's method. Prerequisite: EE 203.

298 Research (arr.)

Research as arranged. May be repeated for credit.

299–300 Thesis Research (3–3)

399 Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

ENGINEERING ADMINISTRATION

160 Introduction to Engineering Economic Analysis (3)

Influence of the time element: interest rates, equivalence, present worth, annual cost, internal rate of return. Incremental analysis. Data for analysis. Characteristics of an accounting system: balance sheet, profit and loss statement, depreciation, allocation of fixed costs, financial statement analysis.

170 Basic Quantitative Methods for Engineering Administration (3)

An introductory treatment of quantitative tools and techniques important in engineering administration, with emphasis on their application. Concepts of probability and decision-making in administrative decisions.

204 Administration of Engineering Contracts (3)

Study of the total contracting process, including initial budget preparation and justification, actions leading to the execution of a contract, and administration of the contract to completion; considered from the viewpoints of the industrial and government buyer and the seller of technical materials and services.

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* EE 250 and 251 cannot be applied toward a graduate degree in the School of Engineering and Applied Science.

211–12 **Engineering Administration** (3–3)

Comprehensive and systematic study of the administrative process; industrial, scientific, and engineering environments. Planning: objectives, prediction, policies, plans and characteristics of plans. Organizing: theory of organization, structure, authority, specialization, delegation, staff and committees. Directing: leadership, managing human and material resources. Controlling: setting standards, evaluating performance, using system feedback data for correction and improvement. Students who receive credit for EAd 211–12 cannot receive credit for EAd 201 *Management for Scientists and Engineers* (3). Prerequisite: EAd 150 *Introduction to Engineering Administration* (3), EAd 160, or equivalent.

241 **Construction Management I** (3)

Contract negotiations; aspects of contracts and specifications important to management. Construction estimating and cost allocation in heavy and building construction; budgeting and accounting concepts.

269 **Elements of Decision-making and Problem-solving** (3)

History and orientation of quantitative methods; concept of quantitative decision-making; decision criteria under certainty, risk, and uncertainty; game theory; utility; the time factor; replacement models. Prerequisite: EAd 170 or equivalent.

ENGINEERING SCIENCE

203–4 **Probability and Statistics of Metrology** (3–3)

Probability distributions, discrete and continuous distributions; sampling; combinatorial analysis; stochastic processes; conditional probability; correlation; analysis of variance; design and analysis of experiments; Latin Square experiments; factorial experiments; block and lattice design. Prerequisite: ApSc 115 or equivalent.

221 **Theory of Elasticity I** (3)

Introduction to Cartesian tensor analysis; deformation, stress, linear constitutive relations, formulation of boundary value problems, variational principles; torsion and bending of prismatical rods, plane problems in elastostatics. Prerequisite: approval of Department.

229 **Transformations in Materials** (3)

Thermodynamics of solids, statistical interpretation of entropy, lattice defects, equilibrium in multicomponent systems, rate theory, diffusion, phase transformations, nucleation and growth, precipitation, martensitic transformations. Prerequisite: approval of Department.

231 **Structure of Materials** (3)
(Formerly Solid State for Engineers)

Space lattices, crystal structures, planes, directions, anisotropy, texture and preferred orientations, stereographic projections, Bragg's law, Laue techniques, moving crystal diffraction, Debye-Scherrer method, x-ray spectrometry, electron microscopy, bonding energy of crystals, lattice energy, lattice vibrations, free electron theory, zone theory, alloy theories, conductors, insulators and semiconductors, magnetism, resistivity, defects in metals. Prerequisite: approval of Department.

234 **Composite Materials** (3)

Principles of composites and composite reinforcement; micromechanics

and failure; interface reactions in various composites; reinforcing materials; structure of composites—fiber-reinforced polymers, filler-reinforced polymers, fiber-reinforced metals, directionally solidified alloys, dispersion-strengthened metals. Prerequisite: approval of Department.

239 **Physical Ceramics** (3)

Crystal chemistry and the systematic study of the structure of ceramic materials; solid reactions occurring at elevated temperatures; sintering vitrification, diffusional mechanisms and effects; reaction rate theory; elastic, anelastic, and plastic properties of ionic and covalent solids; viscoelastic behavior of vitreous and vitreous-solid systems; phase equilibria of ceramic systems. Prerequisite: approval of Department.

240 **Fracture Mechanics** (3)

Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture, linear elastic systems, plasticity considerations, fracture toughness, engineering analysis, notch strength analysis with limit approach, crack propagation laws, fatigue, fracture testing, comparison of recent continuum theories. Prerequisite: approval of Department.

263 **Atmospheric Physics for Engineers I** (3)

Atmospheric radiation: phenomenological equation of transfer; solutions to the transfer equation; optical, physical, and chemical properties of atmospheric constituents; remote sensing and the direct inversion problem; energy transfer and atmospheric structure. Prerequisite: approval of Department.

270 **Introduction to Acoustics** (3)

Waves in an infinite homogeneous medium; sound transmission in layer media and through structure, source, and dipole fields; sound propagation in ducts and enclosures; sound propagation through atmosphere and acoustic absorptions, acoustic circuit elements; acoustic transducers; introduction to acoustic measurements. Prerequisite: approval of Department.

271 **Random Process Theory I** (3)

Random processes; stationarity and ergodicity; mean-square calculus; auto- and cross-correlations and spectra; random processes in linear systems; mean-square estimation, prediction and filtering; zero and level crossings and peak distributions; applications in aerospace sciences. Prerequisite: EngS 203 or approval of Department.

272 **Random Process Theory II** (3)

Discrete and continuous state Markov-processes; chains, queues, diffusion, and passage problems; linear and nonlinear estimation and stochastic control; estimation of correlations and power spectra; applications in communication theory; scattering from random surfaces; stochastic linearization and stability. Prerequisite: EngS 271.

273 **Time Series Analysis** (3)

Harmonic analysis of deterministic and random signals; auto- and cross-correlations and spectra; periodogram, Blackman-Tukey and direct filtering methods of spectral estimation; effects of finite length and digitization; variability; coherence. Fast Fourier transform techniques; applications in modern technology. Prerequisite: EngS 271 or approval of Department.

274 **Noise and Vibration Control** (3)

Introduction to the physical effects of noise and vibration on man, practical sources of noise and their control; building noise, ventilation system

noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. Prerequisite: EngS 270, ME 215.

275 Advanced Theoretical Acoustics (3)

Acoustic wave motion, several methods of solving inhomogeneous wave equation, theory of sources, scattering and diffraction, duct propagation, introduction to acoustically coupled systems, acoustics in moving media. Prerequisite: ApSc 213, EngS 270.

276 Acoustical and Mechanical Measurements (3)

Characteristics of signals, basic transducer elements, standards of measurements and calibrations, signal recording and processing, acoustical and vibration instrumentation, vibration exciters, vibration testing techniques, flow mechanical measurements. Prerequisite: EngS 270, ME 215.

277 Physical Acoustics (3)

Concepts of continuum mechanics and thermodynamics, wave propagation in real media, thermal viscous and relaxational attenuations, piezoelectric crystals and ultrasonics, wave propagation in rigid and deformable porous media. Prerequisite: EngS 275.

278 Psychological and Physiological Acoustics (3)

Auditory system and its response to sound, experimental methodology in psychoacoustics, subjective response to sound, environmental noise and its evaluation, criteria for the prediction of noise nuisance, nonauditory system response to noise. Prerequisite: approval of Department.

279 Human Factors in Engineering (3)

Man-machine interface, effects of physical stresses on human behavior and performance, life support system, learning and conditioning of physical stresses.

280 Special Topics in Acoustics (3)

Current methods and problems in acoustics. Topics chosen from such areas as aerospace noise generation and control; instruments and procedures for acoustics measurements; and responses of structures, people, and communities to noise. Prerequisite: approval of Department.

284 Numerical Methods in Engineering (3)

Review of programming fundamentals; matrix operations and solution of simultaneous equations; difference methods and computer solution of ordinary and elliptic partial differential equations; numerical solution of initial and boundary-value problems in heat transfer, fluid flow, and structural mechanics. Prerequisite: approval of Department.

285 Finite Element Methods in Engineering Mechanics (3)

Formulation of the finite element method through the use of variational principles for structural and continuum mechanics problems. Plane stress, plane strain, three-dimensional elasticity, plate bending, thermal conduction and potential flow. Techniques of constructing and assembling characteristic elemental matrices, computer implementation of the finite element method. Prerequisite: approval of Department.

286 Analysis and Design of Thin-walled Structures (3)

Statics of thin-walled beams and panels, force interplay between stiffeners and skin in the analysis and design of stiffened thin-walled structures; strength and stiffness of locally buckled stiffened structures; classification

of loads and safety factors; different considerations governing the design of thin-walled structures; critical evaluation of various structural design procedures. Prerequisite: approval of Department.

287 **Automated Design of Complex Structures** (3)
Review of techniques for automated design including mathematical programming, fully stressed design, and optimality criteria; application of automated design techniques to stiffened and composite shell-type structures; multiple-load conditions and design constraints. Prerequisite: approval of Department.

289 **Special Topics in Theoretical and Applied Mechanics** (3)
Introduction to nonlinear mechanics of continua. Polar decomposition, invariance, isotropy, representation theorems for invariants and isotropic tensor functions; deformation, kinematics, stress, balance principles; principles for constitutive relations, applications to nonlinear elasticity and non-Newtonian fluids. Prerequisite: ApSc 212.

298 **Research** (arr.)
Basic research projects as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

310 **Aeroacoustics** (3)
General theory of aerodynamic sound generation and propagation, Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise, boundary layer noise, fan and compressor noise, helicopter noise, sonic booms. Current problems in aeroacoustics. Prerequisite: EngS 275.

311 **Nonlinear Acoustics** (3)
Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing walls. Prerequisite: approval of Department.

312 **Theory of Random Vibration** (3)
Response of linear systems to stationary random inputs. Failures resulting from dynamic response. Response of space vehicle structures to intense noise fields, measurement, and application. Prerequisite: EngS 271, ME 215.

313 **Structural Acoustic Interaction** (3)
Coupled response of structures to sound, system of infinite extent, system of finite extent, sound radiation from structure, sound transmission through structure. Panel response to turbulent boundary-layer excitation. Sound radiation from mechanically excited structure vibration. Prerequisite: EngS 270, 312.

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit.

MECHANICAL ENGINEERING

215 **Theory of Vibrations** (3)
Damped and undamped natural vibrations, transient response and response

to harmonic and periodic excitation, natural vibration of discrete and continuous systems; integral formulation of eigenvalue problems, response by modal analysis, approximate methods, influence of secondary effects and constraints, damped systems. Prerequisite: approval of Department.

216 **Structural Dynamics** (3)
Methods of solving vibration problems: differential equation, Rayleigh-Ritz finite element. Free and forced vibration of structural components: straight, curved, and thin-walled beams; plates and shells; sandwich construction. Vibration of built-up structures. Structural wave motion, wave motion in periodic structures. Prerequisite: ME 215.

221 **Intermediate Fluid Mechanics** (3)
The continuum, kinematics of fluids; stress tensor, strain and rate-of-strain tensor; fundamental equations of the flow of viscous compressible fluids; Laplace's equations; source, sink, and doublet; vortices, Biot-Savart theorem and the flow field of a vortex; spherical and cylindrical harmonics; methods of singularity distributions, complex-variable methods; laminar flow of viscous incompressible fluids; boundary-layer concept. Prerequisite: approval of Department.

222 **Applied Fluid Dynamics** (3)
Subsonic lifting line wing theory, direct and inverse solution of the lifting surface theory; singularity method for wing-body combination; vortex lift theory; effects of camber and twist distribution; transonic airfoils, effect of wing sweep, area ruling concept; supersonic linearized wing theory; similarity rules. Prerequisite: ME 221 or equivalent.

227 **Viscous Flow** (3)
Exact solution of Navier-Stokes equations; the small Reynolds number approximations, laminar boundary-layer theory and the techniques for its solution, stability of laminar flows; Reynolds theory of turbulent stresses, applications to internal and external flows, turbulent boundary-layer theory; applications to heat-transfer problems; flow separation. Prerequisite: ApSc 213; ME 221 or equivalent.

235 **Compressible Flow** (3)
Thermodynamics and physical properties of gases, fundamental equations of a compressible inviscid fluid, small perturbation theory, expansions in Mach number and thickness parameters, second-order shock shapes, role of entropy in supersonic flow, shock wave interactions, holograph transformation, Kármán-Tsien and other model gases, conical flows, transonic flow theory, method of characteristics, rotational nonisentropic flows. Prerequisite: ApSc 213; ME 221 or equivalent.

237 **Propulsion** (3)
Basic concepts of propulsion: energy transformations in propulsive flows; gas dynamics of combustion, detonation processes; nonuniform flows, mixing; intakes, additive drag; mechanics of flow induction; drag and thrust generation; multiple-flow thrust generators; thrust recovery and augmentation; the propulsion spectrum. Illustrative examples will include propellers, turbojets, turbofans, ramjets, and rockets. Prerequisite: approval of Department.

248 **Seminar: Aircraft Design I** (3)
Problem of designing an aircraft to certain specifications. Regulatory restraints and requirements, state-of-the-art limitations, computer-aided design, integration of aircraft components, economic considerations, and

iterations to final configuration to obtain specified mission profile. Prerequisite: approval of Department.

270 Aerodynamics of Flight Vehicles (3)

Aerodynamic loads on flight vehicles, interference effects, application of aerodynamic theory to aircraft design, studies of aircraft dynamics and performance. Prerequisite: ME 222 or equivalent.

271 VTOL Aircraft Technology (3)

Fundamental principles of VTOL aircraft; hovering performance based on momentum theory; analysis of jet-induced interference effects; transition aerodynamics; theoretical stability and control and correlation with flight data; ground-effect theory and experiment; handling qualities criteria; elements of instrument approach and landing problem. Prerequisite: approval of Department.

273 Principles of Automatic Flight Control (3)

Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of Department.

274 Principles of Flight Guidance (3)

Guidance requirements for atmospheric flight; implementation of guidance systems using inertial and radio techniques in conjunction with automatic data processing. Prerequisite: ME 273.

275 Stability and Control of Vehicles (3)

Derivation of equations of motion, Euler transformations and direction cosines, stability derivatives and linearization of equations of motion, stability of linear systems with application to longitudinal and lateral dynamics, Laplace transform techniques and frequency response analysis. Prerequisite: approval of Department.

276 Mechanics of Space Flight (3)

First- and second-order Hamilton-Jacobi perturbation theory applied to artificial satellites, von Zeipel's methods, special and general perturbation theories for third-body perturbations. Differential correction of orbits by weighted least squares and minimum variance techniques. Comparison of various filtering techniques as applied to orbit determination and other space flight parameter estimation. Prerequisite: approval of Department.

279 Special Topics in Flight Sciences (3)

Current problems and methods in high angle of attack stability and control. Nonlinear aerodynamics in the angle of attack region above the stall. Influence of aircraft design and nonlinear aerodynamic parameters on the post-stall stability and control of aircraft. Employment of current experimental techniques and development of equations pertaining to developed spin and recovery characteristics. Prerequisite: ME 275 or approval of Department.

280 Advanced Thermodynamics (3)

Statistical significance of the entropy concept, conditions of equilibrium, equilibrium of heterogeneous systems. Application of thermodynamic formalism to magnetic, electric, and solid systems; equilibrium of ionized gases; the Nernst postulate and the third law of thermodynamics. Prerequisite: graduate status.

281 **Nonequilibrium Thermodynamics** (3)

Limitations of equilibrium thermodynamics, entropy production, phenomenological equations and linear laws; postulates of nonequilibrium thermodynamics, formulation of the equations of nonequilibrium systems, statistical foundations, stationary nonequilibrium states; selected applications. Prerequisite: ME 280.

290 **Kinetic Theory of Gases** (3)

Equation of state and physical properties for gas composed of discrete particles; relation of kinetic theory to thermodynamics; Maxwell distribution of molecular velocities; Boltzmann H theorem. Molecular interactions, free paths, collision rates, scattering coefficients. Introduction to diffusion, viscosity, heat conduction; imperfect gases; flow of gases at low density. Prerequisite: ME 280.

297 **Special Topics in Fluid Mechanics** (3)

Prerequisite: approval of Department.

298 **Research** (arr.)

Research as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

English

Chairman: J.P. Reesing, Jr., Professor of English; Stuart 407, Telephone 676-6180

Before students are registered in Engl 10, they are tested in the minimum essentials of vocabulary, spelling, grammar, standard usage, and writing skill. Those students who show marked superiority may, upon passing further tests, be exempted from one or both halves of the English Composition course; those who are inadequately prepared for Engl 10 will be given permission to register for Engl 9 on campus. Engl 9 or 10 is prerequisite to all other courses in English.

ENGLISH COMPOSITION

9 **English Composition: Language as Communication** (3)
(Campus Course)

Intensive course in English grammar and composition for students inadequately prepared for Engl 10. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 10. Engl 9 meets five hours a week and carries 3 semester hours of credit. Fees: tuition, $294; special fee, $25.

10 **English Composition: Language as Communication** (3)

Study and practice of expository techniques; emphasis on the rhetorical

complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure.

11 **English Composition: Language and the Arts and Sciences** (3)

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected books on the nature of language and of the arts and sciences. Prerequisite: Engl 9 or 10.

20 **The Writing of Reports** (3)

Theory and practice in the writing of technical reports. Prerequisite: Engl 9 or 10 and 11.

HUMANITIES

43–44 **Classical Humanities** (3–3)

Interdisciplinary study of the origins of Western thought. Reading and intensive class discussions of selections from the Bible and of five works each semester from the following authors: Homer, Hesiod, Aristophanes, Plato, Aristotle, Aeschylus, Euripides, Sophocles, Herodotus, Thucydides, Lucretius, Marcus Aurelius, Epictetus, Polybius, St. Augustine. Background lectures on the major intellectual, artistic, economic, and social movements.

45–46 **Humanities in the Modern World** (3–3)

Interdisciplinary study of modern Western thought from the Renaissance to the 20th century. Reading and intensive class discussion of five works each semester from the following authors: Machiavelli, Pope, Voltaire, Rousseau, Goethe, Tolstoy, J.S. Mill, Zola, Nietzsche, Kierkegaard, Freud, Kafka, Koestler, T.S. Eliot. Background lectures on the major intellectual, artistic, economic, and social movements.

ENGLISH LITERATURE

51–52 **Introduction to English Literature** (3–3)

Representative works by major authors studied in their historical context; discussion of recurrent themes, and introduction to various types and forms of imaginative literature.

AMERICAN LITERATURE

71–72 **Introduction to American Literature** (3–3)

Historical survey. Engl 71: from the beginnings to the Civil War. Engl 72: from the Civil War to present.

175 **Special Topics in American Literature** (3)

Environmental Health*

For further information call David A. Rowley, Assistant Dean, Graduate School of Arts and Sciences, Telephone 676-6210

* These courses are included in certain interdepartmental programs of the Master of Arts/Master of Science in Special Studies degree which is under the academic jurisdiction of the Graduate School of Arts and Sciences.

201 **Introduction to Epidemiology and Environmental Health** (3)

Open to qualified graduate students. Principles and methodology of epidemiology and biostatistics. Ecological approach to health and disease, including parasitology and mycology.

231 **Venereal Disease in the Community** (3)

A survey course to develop an understanding of venereal disease problems. Etiology, clinical manifestations, diagnosis, prevention, and control. For parents, school teachers, health personnel, and other educators.

240 **Environmental Impact Statement Procedures and Environmental Law** (3)

The rationale for environmental impact statements from the viewpoint of the nature and origins of the environmental crisis. Government agencies responsible for environmental impact statements, current statutes and regulations pertaining to the environment.

254 **Human Ecology** (3)

Ecology—man within the framework of reference—physical and cultural anthropology, geography, sociology, urban planning, public health, and public administration.

256 **Introduction to Environmental Health** (3)

Organizations, functions, current practices, and regulations at all levels to control the environment. Economic impact upon society and industry in carrying out control and preventive practices.

270 **Industrial Hygiene** (3)

Industrial health hazards: chemical exposure to toxic dusts, metallic fumes and vapors, gases, and organic compounds; physical hazards such as high and low temperature biological effects, radiation (electromagnetic, ultraviolet, ionizing), illumination, sound, pressure, and particulate pollution; prevention and control of industrial health hazards.

293 **Public Health and School Health Methods and Activities** (3)

Relationship between public health and school health. The purpose of the course is to aid the teacher in presenting information in the classroom setting.

301 **Applied Epidemiology and Environmental Health** (3)

Lectures, seminars, and case studies. Epidemiological solutions to health problems of the community.

Forensic Sciences

hairman: Charles E. O'Rear, Professor of Forensic Sciences, Samson Hall, elephone 676-7397 or 676-7398

201 **Forensic Serology** (3)

(Formerly Serology, Microscopy, Mineralogy)

Fundamental analysis of blood grouping tests and of those materials primarily identified using the microscope. Specific procedures and techniques utilized in forensic serology—from indicative color tests to blood enzyme classifications and microscopic analyses of hairs, fibers, and reproductive cells. Limitations of the expert in determining blood and human food grouping, and natural and synthetic fiber classification, with subsequent interpretations for courts.

202 **Instrumental Analysis** (3)

Principles and application of various instrumental methods to the examination of criminal evidence, including chromatographic and spectrophometric techniques and mass spectrometry.

203 **Examination of Questioned Documents** (3)

Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture, and fiber analysis; studies of paper and methods of examination of questioned documents.

204 **Firearms and Tool-mark Identification** (3)

Study of methods for identifying firearms, cartridge casings, tool marks, tire marks, and footprints.

*214 **Forensic Psychiatry** (3)

Introduction to the constructs of dynamic psychiatry, psychiatric treatment, and the nomenclature of mental disorders. Consideration of expert testimony, direct examination and cross-examination in hospitalization and criminal cases.

220 **The Crime Lab, the Forensic Scientist,and the Criminal Lawyer** (3)

Survey of the forensic physical sciences; qualifications and preparation of the expert witness, and his role in court in criminal and civil cases; operation and functioning of the crime lab.

224 **Introduction to Criminal Law, Procedure, Evidence, and Legal Methods** (3)

Principles of criminal law and procedure, preparation and presentation of evidence, examination of witnesses, and the methods of legal research.

225 **Advanced Criminal Evidence** (3)

Study of procedural rules affecting the collection and use of physical evidence, with emphasis on court opinions defining the rules of search and seizure and admissibility of evidence. Prerequisite: ForS 224 or equivalent experience.

227 **Advanced Criminal Procedure** (3)

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Prerequisite: ForS 224 or equivalent experience.

228 **Administration of Criminal Justice** (3)

Consideration and analysis of selected advanced problems in the administration of criminal justice. Emphasis on the role and professional responsibilities of prosecutor and defense counsel and on developmental trends in the law. Prerequisite: ForS 224 or equivalent experience.

*229 **The Police and the Community** (3)

Problems and potential of contemporary urban law enforcement: the role and perspective of the police officer.

*231 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3)

Role which knowledge of crime causation may play in assessing devices

* May also be taken through the National Law Center, with permission of the Dean of the National Law Center and of the instructor.

to control deviant behavior: factors related to criminal behavior; current causal theories.

*232 **Law and Criminology II: Society's Responses to the Criminal Offender** (3)

Study of punitive, mechanical, and correctional approaches to offenders. Emphasis on changing responses to criminal and delinquent behavior, and research on effectiveness.

241 **Food and Drug Law** (3)

The Federal Food, Drug, and Cosmetic Act, and related laws. Consumer, government, and industry viewpoints.

251 **Moot Court** (3)

Students will prepare and present direct testimony and be cross examined by an experienced trial attorney in simulated courtroom setting. Class discussions of problems, techniques. Lectures on discovery, admissibility of scientific evidence, chain of custody, use of notes.

254 **Seminar: Selected Topics in the Forensic Sciences** (3)

Exploration of selected current issues in research, investigation, and law.

260 **Introduction to Human Physiology and Pathology** (3)

Introduction to physiology and pathology of the human body; emphasis on medical terminology. Basic understanding of the body functions in health and disease.

261 **Introduction to Forensic Pathology** (3)

Terminology and scientific techniques used in medicolegal investigations, sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

262 **Current Trends in Forensic Pathology and Forensic Odontology** (3)

Emphasis on (1) the relationship among law, medicine, and law enforcement; and (2) the advancement of forensic knowledge.

263 **Seminar: Law, Medicine, and Forensic Sciences** (3)

Emphasis on the introduction of forensic science data/evidence in civil and criminal cases.

264 **Medical Jurisprudence** (3)

Legal problems inherent in the practice of medicine. Laws regulating health personnel and health industry. Emphasis on professional liability.

267 **Histochemistry** (3)

(Formerly Applications of Histochemistry to the Forensic Sciences)

Chemical and physical methods for the localization, identification, and characterization of materials under the microscope, including carbohydrates, enzymes, lipids, minerals, pigments, and proteins.

268 **Photography in the Forensic Sciences** (3)

Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. Laboratory fee, $25.

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y also be taken through the National Law Center, with permission of the Dean of the Na- l Law Center and of the instructor.

269 **Forensic Toxicology** (3)

Analytical procedures used for the detection of drugs, poisons, and toxic agents in biological specimens. Admission by permission of instructor.

295 **Research** (arr.)

Open to qualified master's degree students. Research on problems approved by the Chairman of the Department or academic adviser, under the supervision of an appropriate staff member.

298 **Forensic Sciences Practicum** (4)

Open to qualified master's degree candidates. Internship experience in a crime laboratory or criminal justice agency, under supervision of an appropriate staff member. Weekly seminar held to review, discuss and expand the internship experience.

299–300 **Thesis Research** (3–3)

French*

Chairman: J.F. Burks, Professor of French; Monroe 429, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year French** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern French prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year French** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Fren 4. Conversation, grammar, composition, reading in modern French prose. Aural training, oral practice in language laboratory. Prerequisite: Fren 1–2, or two years of high school French. Laboratory fee, $17.50 a semester.

Geodesy†

Program Adviser: Hyman Orlin, Professorial Lecturer in Geodesy, Cartography, and Oceanography, Telephone 676-6185 or 946-3557

12 **Plane Surveying** (3)

Basic plane surveying. Field exercises as arranged. Prerequisite: Math 30 or permission of instructor.

* Administered by the Department of Romance Languages and Literatures.
† Affiliated with the Department of Geography and Regional Science.

13 **Geodetic Surveying** (3)
Elements of geodetic and hydrographic surveying. Field exercises as arranged. Prerequisite: Geod 12 or permission of instructor.

17 **Elementary Photogrammetry** (3)
Fundamentals of aerial photography, photogrammetric optics, and photographic processes. Recommended prerequisites: Cart 2, Geod 12.

18 **Intermediate Photogrammetry** (3)
Basic theory and practices. Prerequisite: Geod 17.

110 **Map Projections** (3)
Theory of projections in cartography and geodesy. Prerequisite: Math 32.

117 **Advanced Photogrammetry** (3)
Analytic photogrammetry. Prerequisites: Geod 18, Math 32.

155 **Elementary Geodesy** (3)
Principles and formulas basic to theoretical and applied geodesy. Prerequisites: Geod 13, Math 32; or permission of instructor.

156 **Geodetic Astronomy** (3)
Astronomic determination of longitude, time, azimuth, and latitude. Prerequisite: Math 32, Geod 155 or comparable experience.

160 **Adjustment Computations I** (3)
Basic adjustment theory. Prerequisites: Geod 155, Math 32.

161 **Adjustment Computations II** (3)
Topics in advanced adjustment theory. Applications to geodesy and photogrammetry. Prerequisite: Geod 160.

Geography and Regional Science

Chairman: M. Gordon, Professor of Geography and Regional Science; I-200, Telephone 676-6185

51 **Introduction to Geography** (3)
General survey of the systematic fields of human geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts.

52 **Introduction to Economic Geography** (3)
Examination of the basic principles which determine the location of economic activities on the surface of the earth.

127 **Population and Settlement** (3)
Patterns of world population; factors contributing to population pressures, growth, and migrations.

132 **Resource Management and Conservation** (3)
Principles and practices in effective utilization of resources in the United States and selected areas; public policies relating to conservation; environmental systems, perception, and impact studies.

133 **Geography of Poverty and Hunger** (3)
Consideration of the locational aspects and correlates of poverty and hunger; rural and urban poverty regions; regional food budgets and taboos; programs concerned with the elimination of poverty and hunger.

141 **Urban Settlement** (3)
Distribution of urbanization on the surface of the earth; processes which lead to urbanization; theories which can be used to analyze the location of cities.

145 **Cultural Geography** (3)
Analysis of the relationships between culture and environment; emphasis on spatial and ecological considerations.

146 **Political Geography** (3)
Analysis of the interrelationships between the political community and the human and physical environment.

148 **Principles of Geography** (3)
Study of geographic principles, technology and tools designed to meet specific needs of teachers. Emphasis on the practical application of geographic concepts and the use of source materials in the classroom.

155 **Africa** (3)
Survey of the cultural and physical regional patterns of Africa.

161 **Latin America** (3)
Examination of spatial characteristics of physical and cultural phenomena in Middle and South America.

164 **Geography of China** (3)
Survey of the cultural and physical regional patterns of China.

208 **New Perspectives in Geography** (3)
An overview of recent trends in geographic research. Selected topics include diffusion processes, spatial behavior, locational analysis, and environmental perception.

224 **Seminar: Political Geography** (3)
Examination of the political factor in location theory and analysis of the nature of political territories.

243 **Seminar: Urban Geography** (3)
Functional processes affecting the evolving morphology and internal spatial patterns of urban phenomena; emphasis on economic factors, behavioral considerations, and impact of time.

Geology

Chairman: G. Teleki, Professor of Geology; Bell 3, Telephone 676-6190

1–2 **Introductory Geology for Nonscience Majors** (3–3) (Campus Course)
Lecture (2 hours), laboratory (2 hours). Survey covering the principles of geology; emphasis on man's effect on the environment. Laboratory fee, $15 a semester.

3 **Introductory Geology for Nonscience Majors** (3)

Nonlaboratory course for off-campus students only. Survey covering the principles of geology.

4 **Introductory Geology for Nonscience Majors** (3)

Geological periods, evolution of life on earth. Nonlaboratory course for off-campus students only. Prerequisite: Geol 1 or 3, or permission of instructor.

5 **Environmental Geology** (3) (Campus Course)

The relation of man and society to natural environment; population evolution and mineral resources; economic, legal, and political aspects. Laboratory fee, $15.

125 **Marine Geology** (3) (Campus Course)

Lecture and map work. Principles of oceanography and submarine geology; topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: Geol 1–2 or 21–22; or permission of instructor.

141 **Introductory Geochemistry** (3) (Campus Course)

Principles and theories on the abundance, relationships, and distribution of the elements in various rock and mineral species. Prerequisite or concurrent registration: Geol 117 or equivalent; Chem 11–12; Math 30; Phys 1 or 3; or permission of instructor. Laboratory fee, $15.

Germanic Languages and Literatures

Chairman: C. Steiner, Associate Professor of German; Rice 404, Telephone 676-6195

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year German** (3–3) (Campus Course)

Fundamental concepts of German culture; essentials of German structure and basic vocabulary; reading of easy prose and conversation. Aural-oral practice in language laboratory. Prerequisite to Germ 2: Germ 1. Laboratory fee, $17.50 a semester.

3–4 **Second-year German** (3–3) (Campus Course)

Introduction to German civilization, selections from modern German prose, continuation and review of German structure, conversation, and simple composition. Aural-oral practice in language laboratory. Prerequisite to Germ 3: Germ 1–2 or equivalent. Prerequisite to Germ 4: Germ 3. Laboratory fee, $17.50 a semester.

Health Care Administration

Chairman: L. Gintzig, Professor of Hospital Administration; Binney 21, Telephone 676-6220

153 **Survey of Health Care Organization** (3)

Introduction to the organization and delivery of health care services in the United States. Emphasis on the structural features of and the resources available to the health care system.

154 **Introduction to Hospital Management and Procedures** (3)

Introduction to the structure and management of contemporary American hospitals; emphasis on the organization of hospital departments and on the functions of the department manager.

202 **Introduction to Health Care Systems** (3)

Lecture and discussion (2 hours), laboratory (2 hours). Introductory description and analysis of the American health and medical care systems and the organization, characteristics, and relationships of research, technology, manpower, public and private delivery, and financing mechanisms. Survey of major disease problems and their impact on administration and planning. Medical terminology.

203 **Organization and Management of Health Care Institutions** (3)

Lecture and discussion (2 hours), laboratory (2 hours). History and current character of institutional providers of health care. Function, organizational structure, and interrelationships of various types of health care facilities. Institutional ethics; statistics. Regulation of institutional providers.

205 **Hospital Administrative Practices** (3)

(Formerly Hospital Management Procedures)

Lecture and discussion (2 hours), laboratory (2 hours). Organization, management, and interrelationships of hospital clinical, support, and administrative departments. Analyses of procedures and systems. Hospital personnel administration. Administrative ethics. Requirements of the Joint Commission on Accreditation of Hospitals. Prerequisite: HCA 203.

209 **Health Resources Management** (3)

Lecture (2 hours), laboratory (2 hours). Introduction to resources analysis and financial management in health care institutions. Estimation of health services demand and resources requirements. Review and analysis of health services operations; reimbursement by the government and other third parties; medical materials and facilities management; sources of funds.

Hebrew*

Chairman: J.E. Ziolkowski, Associate Professor of Classics; T-23, Telephone 676-6125

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

* Administered by the Department of Classics.

21–22 **Beginning Hebrew** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Clas 22. Elementary Hebrew grammar, readings from the Old Testament and contemporary literature, composition and conversation.

23–24 **Intermediate Hebrew** (3–3) (Campus Course)

Review of grammar; continued development of reading comprehension, composition, and conversation.

History

Chairman: R.W. Kenny, Professor of History; Stuart 419, Telephone 676-6230

Departmental Prerequisite: Students are expected to bring to second-group courses an appropriate level of background preparation. Ordinarily, this is achieved by successful completion of first-group courses in the same area or by presenting evidence of equivalent preparation. Students lacking such preparation may take second-group courses only with the consent of the instructor. Students may waive one or more of the prerequisite courses by passing a departmental waiver examination, by attaining scores of 600 or above on the College Entrance Examination Board Achievement tests, or by good performance on Advanced Placement Examinations.

39–40 **European Civilization in Its World Context** (3–3)

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present.

71–72 **Introduction to American History** (3–3)

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from the beginning to 1876. Hist 72: from 1876 to present.

131–32 **History of Germany** (3–3)

Political, social, and cultural development. Hist 131: from mid-17th century to Bismarck. Hist 132: from William II to present.

138 **History of World Communism** (3)

The international communist movement from its beginning to the present.

145 **Imperial Russia** (3)

From the reign of Peter the Great to World War I.

146 **Soviet Russia** (3)

The Russian Revolution and Soviet rule to the present.

149–50 **European Diplomatic History** (3–3)

Emphasis on policies and actions of the great powers and their statesmen. Hist 149: 1812 to 1890. Hist 150: since 1890. Students who receive credit for Hist 150 cannot receive credit for Hist 157 *20th-century European Diplomatic History*.

163–64 **History of Latin America** (3–3)

Political, socioeconomic, and cultural development. Hist 163: colonial period. Hist 164: national period.

181–82 **U.S. Diplomatic History** (3–3)

Survey of American foreign relations from the era of the American Revolution. Hist 181: to 1898. Hist 182: 20th century.

195–96 **History of East Asia** (3–3)

Civilizations of China and Japan; emphasis on institutional development. Hist 195: beginnings to about 1800. Hist 196: from eve of the modern era to present.

201 **History and Historians** (3)

Students who receive credit for Hist 201 cannot receive credit for Hist 199 *Proseminar: Readings for the History Major.*

Human Kinetics and Leisure Studies

Chairman: J.L. Breen, Professor of Human Kinetics and Leisure Studies; K–20, Telephone 676-6280

101 **Physical Education in the Elementary School** (3)

For elementary education and human kinetics and leisure studies majors. Child growth and development related to school and playground programs in movement. Philosophy, curriculum, techniques of teaching, and equipment evaluation.

119 **Creative Dance for Children** (3)

Dance as an expressive art medium for children; emphasis on concepts and principles, methods and materials. Consideration given to dance for children with special education problems.

184 **Workshop in Human Kinetics and Leisure Studies** (1 to 3)

Workshops in human kinetics and leisure studies, dance, and recreation. Current problems, practices, and new approaches. Content of each workshop will depend on current needs. May be repeated for credit with permission of adviser.

202 **Conceptual Basis of Motor Learning** (3)

Variables of perceptual motor learning and performance; theories, concepts, and models of learning related to the development of motor skills.

232 **Current Issues in Elementary School Physical Education** (3)

Current philosophy, trends, and research; implications for curriculum, instruction, evaluation.

239 **Urban Recreation for Special Populations** (3)

Development of recreation for the disabled, impaired, and handicapped using the Baltimore-Washington areas as the urban problem setting; development of competencies in community organization, communications, consultation, group dynamics, and interpersonal relations; program development and evaluation.

240 **Physical Education for the Handicapped** (3)

Adaptive physical education for handicapped populations; development of competencies in diagnostic/prescriptive teaching, program design and evaluation, consultation, and communications.

244 **Therapeutic Recreation Practice** (3)

Professional competencies for delivery of services to the handicapped, disabled, impaired; public and private setting for service delivery; client assessment and counseling techniques; basic special education, medical, and rehabilitation terminology; etiology af handicapping conditions as related to recreation.

250 **Administration of Leisure and Tourism Services** (3)

Planning and organization of a comprehensive system of urban leisure services utilizing educational, cultural, and recreational resources; emphasis on public relations, personnel administration and supervision, systems analysis, fiscal management and managerial accountability.

260 **Tourism Development** (3)

Socioeconomic analysis of demand for travel and tourism resources, techniques for planning and design; examination of current trends.

280 **Advanced Workshop** (1 to 3)

Workshops in human kinetics and leisure studies, dance, and recreation. Emphasis on contemporary issues and problems; development of advanced professional competencies. May be repeated for credit with permission of adviser.

Italian*

Chairman: J.F. Burks, Professor of French; Monroe 429, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Italian** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Ital 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Italian prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year Italian** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Ital 4. Conversation, grammar, composition, reading of modern Italian prose, introduction to Italian civilization. Aural training, oral practice in language laboratory. Prerequisite: Ital 1–2 or two years of high school Italian. Laboratory fee, $17.50 a semester.

Journalism

Chairman: Philip Robbins, Associate Professor of Journalism; Stuart 301E, Telephone 676–6225

* Administered by the Department of Romance Languages and Literatures.

116 **Magazine Layout and Design** (3)

Layout, typography, and design for magazines, newsletters, house organs, and similar publications for associations, institutions, and industry.

145 **Principles and Problems of Public Relations** (3)

Principles, problems, and ethics of public relations for government agencies, commercial establishments, educational and other public institutions. Case histories of successful programs.

Latin American Civilization—Special Program

Program Director: R.C. Burns; Building LL, Telephone 676-7049
Faculty Consultants: Marvin Gordon, Professor of Geography and Regional Science; R.L. Humphrey, Jr., Associate Professor of Anthropology; P.F. Klarén, Associate Professor of History; J.W. Robb, Professor of Romance Languages; B.M. Sapin, Professor of International Affairs and Political Science.

101 **Latin American Civilization** (3)

A three-week, University-conducted study program in a selected area in Latin America, effecting a broad synthesis of history, politics, economy, geography, language, and literature in order to achieve an understanding of contemporary problems and assess national attitudes in the light of world relations. On-the-spot seminars, guest lectures at universities, instructional visits to government offices, first-hand observation of each country and the operation of its economy, comparisons and contrasts among the countries of the area. May be repeated for credit.

Law Enforcement Program

Faculty Adviser: Earl H. Williams, Assistant Professorial Lecturer in Forensic Sciences, R-15, Telephone 676-7124.

30 **Introduction to Law Enforcement** (3)

Survey of law enforcement: role of police officers; legal aspects; evidence; court procedures; investigation and crime prevention.

31 **Introduction to Criminal Justice System** (3)

Survey of components of the criminal justice system; the police, prosecution, defense, courts and corrections.

32 **Police Organization and Administration I** (3)

Introduction to police organization and administration. Discussion of organization, inspection, training, and the operational services of police departments.

40 **Introduction to Industrial Security** (3)

Survey of industrial security in the world of commerce. Discussion of the policies, functions, authority and limitations of industrial security personnel.

41 **Physical Security** (3)

Discussion of physical security policies and procedures in the collection,

processing, manufacturing or treatment, storage, transportation and sale of products.

121 **Survey of Forensic Science I** (3)

Physical evidence in criminal cases: theory, principles, procedures, and techniques of examination of explosives, firearms and projectiles, tools, toolmarks, metallurgy, tire treads, shoe prints, footwear, fingerprint, voiceprint, polygraph, soils, plants, minerals, and plastics.

122 **Survey of Forensic Science II** (3)

Physical evidence in criminal cases continued: theory, principles, procedures, and techniques of examination of paints, pigments, wood, glass, questioned documents, body fluids, hairs, fibers, arson, toxicology, narcotics, medicolegal evidence, and photography.

123 **Criminal Investigation** (3)

In-depth analysis and discussion of investigative procedures in criminal cases: interviews and interrogation; surveillance and sources of information; investigation of crimes of violence and fraud emphasizing case-study approach.

131 **Police Organization and Administration II** (3)

Analysis of organizational structures in small, medium, and metropolitan size police agencies: purpose, functions, and divisions of responsibilities; organizational communication factors. Administrative factors peculiar to police agencies in relationships with local governmental authorities, agencies, and community groups.

141 **Criminal Evidence for Police** (3)

Comprehensive analysis of the various forms of criminal evidence with emphasis on judicial requirements for the presentation in court of criminal evidence in cases.

142 **Criminal Law and Procedure** (3)

Analysis of processes and procedures of investigation, indictment, adjudication, sentencing and conviction, and correctional procedures.

151 **Criminal Law in the District of Columbia** (3)

Comprehensive analysis of the criminal laws of the District of Columbia: judicial interpretations and application of court decisions to law enforcement practices and procedures.

152 **Criminal Law in Maryland** (3)

Comprehensive analysis of the criminal laws of the State of Maryland: judicial interpretations and application of court decisions to law enforcement practices and procedures.

153 **Criminal Law in Virginia** (3)

Comprehensive analysis of the criminal laws in the state of Virginia: judicial interpretations and application of court decisions to law enforcement practices and procedures.

160 **Presentation of Testimony** (3)

Witness testimony in criminal cases presented in court: rules of evidence (competency, materiality, relevancy); admissibility of testimony; types of witnesses and depths of testimony; and judicial conduct of witness procedures.

161 **Environmental Law** (3)
Enforcement of legislation governing environmental safety and health: common law remedies; functions and responsibilities of investigative and regulatory agencies.

162 **White Collar Crime** (3)
Discussion and analysis of the methods, forms, types, operations, and techniques of crimes of fraud, extortion, and intimidation: embezzlement, pilferage, securities, consumers, computers, insurance, bribes and bankruptcy.

163 **Police and Community Relations** (3)
Factors in human relations as they affect policing and police management procedures, practices, and policies. Prejudice and discrimination and their effects on law enforcement agencies and officers in a changing society.

164 **Evidence Photography** (3)
Theories, principles, practices and procedures involved in use of photography in the enforcement of law, investigation of crimes, and documenting scenes and information.

165 **Organized Crime** (3)
Survey and analysis of the origins, organizational structure, functions and actions of organized crime; governmental efforts to combat; and indications of organized crime recognizable by uniformed police officers.

180 **Law of Arrest, Search and Seizure** (3)
Intensive discussion and analysis of the laws of arrest, search and seizure as they affect the private citizenry and police officers; in-depth examination of court decisions (Miranda, etc.).

Management Science

Chairman: J.F. McCarthy, Jr., Associate Professor of Business Administration; Building CC 10, Telephone 676-7375

118 **Introduction to Information Processing** (3)
Basic principles, terminology, and methods of computer data processing. Introduction to the use of the computer as a tool through homework assignments illustrating typical problems encountered in business and government data processing. Assignments involve flow charting and computer programming in a higher level language (FORTRAN) and are run on the SGBA's computer with the school's computer terminals. Laboratory fee, $25 (applicable to off-campus locations having access to the University and SGBA computer centers).

119 **Computer Programming for Information Systems** (3)
COBOL programming for business and government data processing applications. For students already familiar with basic computer concepts, flow charting, and programming. Emphasis on practical computer applications in accounting and management information systems. Prerequisite: Mgt 118 or Stat 97. Laboratory fee, $25 (applicable to off-campus locations having access to the University and SGBA computer centers).

120 **Information Systems Development I** (3)
Assessment of the systems concept and its relationship to organizational

information decision-making and management. Concepts and techniques involved in the initial development of new or revised computer-based information systems, e.g., systems analysis and design phases. Prerequisite: Mgt 118, 119; or permission of instructor.

121 **Information Systems Development II** (3)

A further examination of the information systems development process, including concepts and techniques for assessment, selection, introduction, operation, and maintenance of a newly designed automated information system. Prerequisite: Mgt 120 or permission of instructor.

122 **Special Studies in Information Systems** (3)

An independent or group-study project in information systems development which may involve faculty-supervised research, a case-study project, or field experience as an intern systems analyst in a local public or private organization. Prerequisite: Mgt 121 or permission of instructor.

201 **Advanced Administrative Management** (3)

Integrative approach to organization and management concepts, philosophy and theory as applied to all types of agencies and institutions. Evolution of management thought, functions and practices in various organizational contexts; contemporary issues confronting the manager.

203 **Mathematics for Management** (3)

Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus, and linear algebra to optimization problems. Prerequisite: knowledge of algebra.

204 **Quantitative Factors in Administration** (3)

Survey of quantitative techniques in solution of management problems. Potentials and limitations of mathematical models and proper areas for their application. Breakeven analysis, linear programming, probability, decision-making under uncertainty, queuing models, inventory models.

207 **Human Behavior in Organizations** (3)

Individual, group, intergroup, and other human behavior and development; application of behavioral science research to administration. Learning exercises and practical applications emphasized. Prerequisite: Mgt 201.

208 **Current Issues in Organizational Behavior** (3) (Campus Course)

Study of behavioral factors relating to issues such as automation, ethics, interpersonal relations, organizational change, and similar problems. Problems in behavioral science research. Prerequisite: Mgt 207.

210 **Behavioral Factors in the Process of Change** (3) (Campus Course)

Review of research, theory, and practice related to the process of change. Basic principles of planned change; individual, group, organization, community and cultural change. Emphasis on the relationship between human behavior research and theory and the change process. Prerequisite: Mgt 207 or permission of instructor.

212 **Organizational Development: Concepts and Methods** (3) (Campus Course)

Primarily for doctoral students. Examination of different concepts of organizational structure, processes, and growth. Models of organizational

change will be developed with a taxonomy of methods of initiating action to further organizational development. The methods of action, research, team building, confrontation methods, objectives analysis, survey research, and structural revision will be related to organizational development processes. Prerequisite: Mgt 207, 210 or equivalent.

213 **Consultative Processes in Organizations** (3) (Campus Course)

Primarily for doctoral students. Examination through actual practice as well as theory of the nature of the helping process between one person or group and another person or group. Dynamics of the consulting process will be explored as well as role differences in internal and external consultation. Development of skill in the helping relationship will be furthered within the framework of interpersonal relation concepts and laboratory experiences. Prerequisite: Mgt 207, 210 or equivalent.

225 **Managerial Statistics I** (3)

Mathematics of probability and statistics and application to management science and operations research. Topics include sample spaces, probability models and random variables, discrete and continuous probability distributions, moments and other descriptive measures, sampling theory and practice, and point and interval estimation. Prerequisite: Mgt 203 or equivalent.

226 **Managerial Statistics II** (3)

Applications of the theory and techniques of mathematical statistics. Topics include hypothesis testing, nonparametric methods, analysis of variance, introduction to statistical decision theory. Prerequisite: Mgt 225.

227 **Mathematical Programming: Techniques and Applications** (3)

Technical and applied considerations of linear programming and related methods. Mathematical and computational aspects of linear programming. Formulation of linear programming models. Studies of applications of linear programming. Introduction to integer programming, algorithms and formulations. Prerequisite: Mgt 203 or equivalent.

228 **Techniques of Operations Research** (3)

Survey and introduction to contemporary operations research techniques, including nonlinear programming, dynamic programming, inventory and queuing models and simulation. Applications of such methods as models of common processes. Prerequisite: Mgt 225, 227.

229 **Seminar: Management Sciences and Operations Research** (3)

Supervised in-depth study and advanced projects in applied operations research. Prerequisite: Mgt 228 or permission of instructor.

240 **Survey of Information Technology** (3)

Management oriented survey of key areas in information technology. Includes hardware configurations, processing procedures and new developments; software languages, capabilities, procedures and interactive programming; systems technology, analysis and design, systems concepts, modeling and simulation impact on the organization; EDP management areas, equipment upgrading; replacement and acquisition; personnel practices; budgeting and costing procedures, security of the facility; legislative and social issues, Freedom of Information Act, Family Educational Rights and Privacy Act of 1974, employment patterns, professionalization, shifts in power and value systems. Laboratory fee, $25 (applicable to off-

campus locations having access to the University and SGBA computer centers).

241 Management Information Systems Development and Application (3)

Contemporary theories and practices in the development of management information systems. Participation in the design of information systems specifications. The roles of both management and systems design personnel in the systems development process studied and evaluated. Impact of management information systems upon the organization and its decision-making processes evaluated. Case studies. Prerequisite: an introductory course in information technology, or permission of instructor.

242 Comparative Computer Systems (3)

Characteristics and capacities of the range of information processing equipment in use today. Recent and prospective equipment and software development. Selection of computers and related software and equipment. Prerequisite: Mgt 241 or permission of instructor.

243 Management of Information Technology (3)

Advanced course; emphasis on principles, practices, and trends in the management of information technology. Topics include the role and control of an information processing installation; trends, new hardware, and advanced technology in the computing milieu and their implications for information processing management; and analysis of the performance of the data processing activity internally and externally, according to developed criteria. Case studies. Prerequisite: Mgt 241, 242; or permission of instructor.

244 Information Systems and Telecommunication (3)

Study of the growing linkages among the technology of information processing, information transmission, and organization management—computers, communications, and managers—from two points of view: (1) new potentials for improved management, and (2) solving communications-related problems of informations systems design, implementation, and operation. Admission by permission of instructor.

245 Data Base Management (3)

An in-depth approach to the understanding and use of the latest techniques for developing and implementing an effective data base system. Topics include data base organization, creation, and maintenance; effort and economic justification; evaluation criteria; standardization of data base systems; impact of packaged data management systems; and an analysis of the current state-of-the-art in data base development. Students will become proficient in the use of an actual data base management system. Prerequisite: Mgt 119, 241. Laboratory fee, $25, (applicable to off-campus locations having access to the University and SGBA computer centers).

249 Seminar: Information Technology (3)

Current problems in the design and implementation of computer-supported systems; emphasis on current state-of-the-art through discussion with leading experts in the field, analysis of literature. Prerequisite: Mgt 241, 242, 243; or permission of instructor.

260 Introduction to General Systems and Cybernetics (3)

Analysis of fundamental general systems concepts and cybernetic theories evolving in various branches of knowledge and academic disciplines,

emphasizes their transcontextual and interdisciplinary nature. Systems approach and general systems frame of reference compared and contrasted. Topics include living systems and cross-level hypotheses; pervasiveness of nature's entropic thrust; taxonomies of systems, feedback loops in open systems, and homomorphic and isomorphic relationships as conceptual tools. Cybernetic systems, such as homeostatic, heterodynamic, and morphogenic; metalanguages and metasystems; ultrastability and equifinality; essential requirements of a viable system.

261 **Fundamentals of General Management Systems and Organizational Cybernetics** (3)

Dynamics of organization and management from a general systems and cybernetics viewpoint. GEMSOC potential for integrating apparently disparate aspects of organization and management research and theory. Translation of GEMSOC research and theory into the world of organizational behavior and management practice. Prerequisite: Mgt 260.

263 **Case Studies and Field Research in GEMSOC** (3)

Investigations of existing organizational structures and ongoing management processes from a systems and cybernetics viewpoint. Operational evaluations of firms and agencies, including intercontextual comparative studies. Assessments of need for better tools of analysis and synthesis. Prerequisite: Mgt 261.

264 **Organizational Dynamics Simulation and Metasystematic Modeling** (3)

Literature review and current practice analysis. Operation research and conventional modeling techniques, including iconic, analog, and symbolic. Computerized organization dynamics simulation as a management tool. Institutional structure simulation and metasystemic modeling developed by students. Evaluation of organization dynamics modeling and the state of the science and art of computer simulation. Problems and prospects. Prerequisite: Mgt 261.

*280–81
–82 **Managerial Aspects of National Security** (3 or 4–3 or 4–3)

The application of business management principles to the military aspects of national security; organization and administration of the federal government for national defense; management of national resources (natural, human, energy, economic); budgeting and controllership; determination of requirements; procurement; production; supply management; and communications.

295 **Research Methods** (3)

Research techniques, sources of information, array and analysis of data, interpretation and presentation of the findings.

Mathematics

Chairman: D. Nelson, Professor of Mathematics; Library 719J, Telephone 676-6235

No Mathematics courses numbered 1 to 100 are available for college credit if the

* Available only to students in the Master of Science in Administration program at the Industrial College of the Armed Forces.

student's previous training in mathematics meets the prerequisite for a higher numbered course.

Graduate credit may not be given for Mathematics courses numbered from 101 to 200 without the permission of the Chairman of the Department.

3 College Algebra (3)

Equivalent to the standard two years of high school algebra with several additional topics. Prerequisite: one year each of high school algebra and high school geometry.

6 Plane Trigonometry (3)

Prerequisite: two years of high school algebra and one year of high school geometry, or Math 3 (or concurrent registration therefor).

9 General Mathematics I (3)

For students electing Math 9 and 10 as a terminal sequence. Logic, sets, number systems. Prerequisite: two years of high school mathematics.

10 General Mathematics II (3)

Mathematical systems, geometry, and introduction to statistics and probability. Prerequisite: Math 9.

30 Precalculus (3)

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students must take a placement examination in algebra and trigonometry.

31 Calculus of One Variable (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent. Math 30 may be waived as a prerequisite by examination on scheduled dates.

32 Calculus of Several Variables (3)

Vectors, determinants, partial derivatives, multiple integrals, and infinite series. Prerequisite: Math 31.

33 Calculus of Vector Functions (3)

Curves, differential equations, infinite series, vector calculus, line integrals, Green and Stokes theorems. Prerequisite: Math 32.

***51 Mathematics for the Social and Management Sciences I (3)**

Notion of function, graph of function, and sequences; differential calculus of functions of one variable; exponential and logarithmic functions. New students must take a placement examination in algebra prior to registration.

***52 Mathematics for the Social and Management Sciences II (3)**

Integral calculus of functions of one variable; functions of several variables; partial derivatives, maxima and minima, Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51.

*Social and management science students with a strong record in high school mathematics are advised to take Math 31, 32, and 124 instead of Math 51 and 52.

111 Mathematics for Engineers and Physicists I (3)

Linear differential equations, linear algebra, Fourier series and integral, nonlinear differential equations of the first order. Prerequisite: Math 32.

112 Mathematics for Engineers and Physicists II (3)

Ordinary differential equations, systems of differential equations, boundary-value problems, partial differential equations. Prerequisite: Math 111.

124 Introduction to Matrix Theory (3)

Operations on matrices, linear equations, matrix inversion, vector spaces, characteristic roots and vectors, Hamilton-Cayley Theorem. Systems of linear difference and differential equations. Quadratic forms. Prerequisite: Math 32 or permission of instructor.

134 Introduction to Boundary-value Problems (3)

Prerequisite: Math 111 or 142 *Theory of Differential equations.*

139 Advanced Calculus I (3)

Review and extension of elementary one-variable calculus, emphasis on the theoretical foundations; differential calculus of several variables. Prerequisite: Math 33.

140 Advanced Calculus II (3)

Differential and integral calculus of several variables; contraction maps, implicit function and differential equation theorems. Prerequisite: Math 139 or equivalent.

153 Introduction to Numerical Analysis (3)

Introduction to fundamentals of numerical analysis using modern digital computers. Solution of linear systems and of ordinary differential equations. Interpolation polynomials. Iterative solution of nonlinear equations. Simple quadrature techniques. Prerequisite: Math 111 or 139, or equivalent.

Music

Chairman: George Steiner, Professor of Music; FF–10, Telephone 676-6245

3 Introduction to Musical Understanding (3)

Introductory history of musical styles, related to listening; elements and materials of music.

4 Survey of Music Literature (3)

Introductory study of musical forms, structures, and textures; aural analysis of selected literature.

Oceanography*

Program Adviser: Hyman Orlin, Professorial Lecturer in Geodesy, Cartography, and Oceanography, Telephone 676-6185 or 946-3557

* Affiliated with the Department of Geography and Regional Science.

11 **Navigation** (3)

Theory of navigation, charts, navigation aids, celestial navigation, shipboard instruments.

101 **Oceanography for Science Majors I** (3)
(Formerly Oceanography I)

Chemical and physical properties of the oceans. Laboratory and field trips as arranged. Prerequisite or concurrent registration: Math 31, Phys 1 or 3, or permission of the instructor.

102 **Oceanography for Science Majors II** (3)
(Formerly Oceanography II)

Physiography and characteristics of the sea floor, ocean basins and margins. Marine biology and ecology. Laboratory and field trips as arranged. Prerequisite or concurrent registration: Geol 1 or 3, BiSc 11, or permission of the instructor.

103–4 **Introductory Oceanography for Nonscience Majors** (3–3)

Survey of oceanographic principles; emphasis on oceanographic processes. Field trips as arranged.

105 **Elementary Geophysics** (3)

Gravity, geomagnetism, and seismology in cartography, geodesy, and oceanography. Prerequisite: Math 31.

110 **Physical Oceanography** (3)

Physical properties of sea water, underwater sound, and propagation of light. Currents, heat budget, turbulence, and the general circulation and water masses of oceans. Laboratory and field trips as arranged. Prerequisites: Math 32, Ocea 101.

111 **Ocean Waves and Tides** (3)

Survey of tidal theory and analysis. Field trips as arranged. Prerequisites: Math 32, Ocea 101.

112 **Biological Oceanography** (3)

The study of life in the sea. Laboratory and field trips as arranged. Prerequisite: Ocea 102.

113 **Marine Geophysics** (3)

Principles of marine geophysical measurements and interpretation. Prerequisites: Ocea 105, Phys 1.

114 **Chemical Oceanography** (3)

Chemical processes in the marine environment, including composition of sea water, nutrients, natural composition and variation, carbonate cycle, and extraction. Prerequisites: Chem 12, Ocea 101.

115 **Geological Oceanography** (3)

Physiography of the sea floor and processes active in ocean basins and margins. Laboratory and field trips as arranged. Prerequisite: Ocea 102.

120 **Coastal Ecology** (3)

Coastal ecosystems and how they function; the impact of man's activities. Impact of specific topical activities. Prerequisite: Ocea 102 or permission of instructor.

122 **The United States and the Oceans** (3)

Tracing the nation's involvements in marine affairs; the effect upon domestic policy regarding alternative ocean uses.

124 **Introduction to the Law of the Sea** (3)

The changing role of the oceans in international relations.

130 **Fisheries Biology and Management** (3)

Examination of ocean and fresh water yields; emphasis on effect on populations fished, maximum and optimum yields, and how, for whom, and for what purpose fisheries are regulated.

Oral Biology

Program Adviser: E.A. Caress, Assistant Dean of the Graduate School of Arts and Sciences; Bacon 201, Telephone 676-6210

The courses listed below are open only to students in the program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology. This degree program is offered by the Graduate School of Arts and Sciences in cooperation with the Army Institute of Dental Research at the Walter Reed Army Medical Center (see page 90).

207 **Physical Diagnosis** (1)

208 **Biochemistry** (1)

209 **Pharmacology** (1)

210 **Microbiology** (2)

211 **Biostatistics and Research Methodology I** (2)

212 **Biostatistics and Research Methodology II** (1)

213 **Oral Pathology I** (2)

214 **Oral Pathology II** (2)

215 **Human Anatomy** (1)

216 **Dental Materials** (1)

217 **Dental Behavioral Science** (1)

Pharmacology

Chairman: H.G. Mandel, Professor of Pharmacology; Ross Hall, Telephone 676-3541

115 **Drug Abuse Education** (3)

Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems, legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous sys-

tem stimulants and depressants, marijuana and other hallucinogenic and psychedelic drugs.

215 **Adolescent Drug Abuse** (3 or 4)

Primarily for teachers, counselors, and administrators. Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse.

Philosophy

Chairman: T.Z. Lavine, Elton Professor of Philosophy; Rice 611, Telephone 676-6266

50 **Introduction to Philosophy** (3)

Readings from major philosophers and study of philosophic positions from Plato to the present.

111 **History of Ancient Philosophy** (3)

History of Western philosophy from early Greece to the early Middle Ages.

131 **Ethics** (3)

Main types of ethical theory: egoistic, utilitarian, self-realization, conscience, existentialism. Applications to contemporary problems.

162 **Aesthetics** (3)

Nature of aesthetic experience, problems of appreciation and criticism in the arts, and theories of artistic creation. Emphasis on contemporary arts and criticism.

172 **American Philosophy** (3)

Philosophies of Peirce, Royce, James, Dewey, and Santayana as representatives of American thought.

193 **Contemporary Philosophy: Phenomenological** (3)

The phenomenological movement, including its development into German and French existentialism, and its more recent phases.

Physics

irman: H.H. Hobbs, Professor of Physics; Corcoran 102, Telephone 676-6275

RONOMY

9–10 **Introduction to Astronomy** (3–3) (Campus Course)

Lecture (2 hours), recitation (1 hour), laboratory (2 hours). Classical through modern astronomy with introduction to basic principles underlying

astronomical systems and observations. Primarily for nonscience majors. Laboratory fee, $11 a semester.

PHYSICS

1 **Foundations of Physics** (4) (Campus Course)
Development of conceptual principles underlying modern physical knowledge; basics of mechanics, heat and electromagnetism, including the classical concepts of energy, momentum, heat, temperature, entropy, electric and magnetic fields, optics. Prerequisite: two years of college preparatory mathematics or concurrent registration in Math 6. Laboratory fee, $18.

2 **Introduction to Modern Physics** (4) (Campus Course)
Topics focusing upon present understanding of the physical universe and character of the atomic and subatomic worlds. Includes considerations of length and time in relativity theory, present understanding of gravitation, wave-particle duality, quantum theory, nuclei, subnuclear particles. Prerequisite: Phys 1 or equivalent. Laboratory fee, $18.

*3 **Foundations of Physics** (3)
Same as Phys 1 without laboratory.

†4 **Introduction to Modern Physics** (3)
Same as Phys 2 without laboratory.

Political Science

Chairman: B. Reich, Professor of Political Science and International Affairs; C–619, Telephone 676-6290

Departmental prerequisite: PSc 4 and 6 or 5 and 6 are prerequisite to courses in political science numbered from 101 to 200. Courses numbered from 201 to 300 are for graduate students who have the appropriate undergraduate course prerequisites.

4 **Introduction to Political Science** (3) (Campus Course)
The study of political behavior, including the role of politics in today's world, the sources of elite and mass political behavior, and the influence and nature of political institutions. Students who receive credit for PSc 4 cannot receive credit for PSc 5.

5 **Introduction to Political Science** (3)
Introduction to the study of comparative political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies. Students who receive credit for PSc 5 cannot receive credit for PSc 4.

6 **Introduction to Political Science** (3)
Introduction to the study of the structure, powers, and processes of the American political system.

* This course may not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 1.

† This course may not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 2.

103 State Politics (3)

Theory and practice of American federalism, factors influencing state policy choices, state responsiveness to urban problems.

104 Urban Politics (3)

Demographic trends and implications, local metropolitan political systems, issues in urban politics, strategies of political change.

111 Comparative Government and Politics (3)

Government and politics of the principal constitutional democracies of Western Europe.

***112 Comparative Government and Politics** (3)

Government and politics of the communist nations; emphasis on the Soviet Union and the countries of Eastern Europe.

117–18 Political Theory: Major Issues of Western Political Thought (3–3)

PSc 117: foundations of Western political thought—Plato to Aquinas. PSc 118: philosophical roots of modern political order and disorder—Machiavelli to Rousseau.

119–20 American Political Thought (3–3)

Introduction to political thought in the United States from colonial times to the present.

121–22 U.S. Constitutional Law and Politics (3–3)

PSc 121: separation of powers, federal-state relationships, economic regulation. PSc 122: political and civil rights. Prerequisite: junior status.

125 Legislative Process (3)

Study of Congress, including theories of representation, legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches.

126 The American Presidency (3)

Examination of the politics of Presidential selection, the authority of the contemporary institution, the mechanisms and processes for formulating public policy, and the influence of personality on performance in office.

145 U.S. Political Parties and Politics (3)

Party system and structure, role of ideology, voting behavior, campaigns and elections, devices for organizing the government.

151 Public Administration and Public Policy-making (3)

Examination of the process by which the federal government selects and implements public policies. Particular attention to the role of bureaucracies in the policy-making process. Criteria for the evaluation of public policy.

167 U.S. Foreign Policy (3)

Constitutional and political factors that determine the formulation, execution, and substance of U.S. foreign policy.

171 International Politics (3)

International actors, international and domestic environments of foreign

*PSc 112 and 115 are related in their subject matter, and credit for only one may be applied toward a degree.

policy, global and regional patterns, general characteristics of foreign policy.

172 **International Organizations** (3)
Development and operations of the United Nations, regional organizations, and functional international organizations.

181 **Public International Law and Organization** (3)
Survey of international law; emphasis on development and trends.

190 **Politics of Middle and Southern Africa** (3)
Comparative analysis of the political systems of selected countries of non-Mediterranean Africa.

191 **Governments and Politics of the Middle East** (3)
Domestic and international politics of the eastern Arab states, Turkey, Iran, and Israel.

192 **Governments and Politics of North Africa** (3)
Domestic and international politics of Algeria, Tunisia, Morocco, Libya, Egypt, Sudan; their relations with states of the Middle East.

193 **Governments and Politics of South and Southeast Asia** (3)
Domestic and international politics of the major states in the area.

194 **Governments of China and Japan** (3)
Institutions and processes of government in contemporary China and Japan, with some historical background. Attention to ideological forces. Students who receive credit for PSc 194 cannot receive credit for PSc 162 *Government and Politics of China.*

204 **Urban Politics** (3)
Readings and discussions on patterns and implications of urban growth, local and metropolitan political systems, policy formation and change, conflict management, political constraints on social reform.

205 **Government, Science, and Technology** (3)
Examination of the demands on national and international political systems resulting from the impact of scientific and technological developments and of the responses of governmental institutions and processes to these demands.

206 **Science, Technology, and Public Affairs** (3)
In-depth examination of selected domestic policy issues with significant scientific or technological aspects. Teams of students will prepare policy analyses on each issue discussed.

209 **The Legislative Presidency** (3)
(Formerly Presidential-Congressional Relations)
Examination of the formulation, coordination, and oversight of domestic policy within the contemporary presidency and its liaison with Congress.

211–12 **Comparative Government and Politics** (3–3)
Problems of comparative political analysis; a comprehensive examination of the literature in comparative politics.

215–16 **Seminar: the Communist Camp in World Politics** (3–3)
Significant issues of communism, particularly in the Soviet Union and Red

China; concept and structure of "world socialist system"; intra-bloc relations with emphasis on the Sino-Soviet dispute.

220 **Congress and the Political System** (3)
Examination of the roles, structure, and function of political parties and interest groups as they relate to the legislative process.

222 **Judicial Policy-making and Civil Liberties** (3)
Examination of the role of the judiciary in policy formulation; emphasis on the U.S. Supreme Court and civil liberties issues.

223 **Defense Policy Analysis** (3)
Analysis of selected topics in U.S. defense policy.

239 **Economic Policy Analysis** (3)
Analysis of selected topics in U.S. monetary and fiscal policy.

240 **Legislative Theory and Behavior I** (3)
Selected problems of the U.S. legislative system at the national and state level. Emphasis on legislative recruitment, representative-constituency relations, policy-making and communication.

241 **Legislative Theory and Behavior II** (3)
Selected problems of legislative theory and behavior from a comparative perspective with particular reference to the parliamentary systems of West Germany, France, and Britain.

242 **Methods of Legislative Research** (3)
The process of empirical research: construction of research design, data collection, and analysis. Techniques discussed will include content analysis, survey research, and analysis of institutional voting.

243 **The Political Process—Selected Topics** (3)
Examination of selected aspects of the political process in the U.S.

244 **Public Policy Analysis** (3)
Reading and research on systematic methods of public policy analysis.

247 **Legislative Elements in Economic Policy Development** (3)
Economic analysis of selected legislative issues and the effect of various economic pressures on policy outcomes.

248 **Public Opinion and Voting Behavior** (3)
Analysis of mass political attitudes and voting behavior.

249 **Domestic Policy Analysis—Selected Topics** (3)
Analysis of U.S. policy toward selected domestic problems.

259 **Foreign Policy Analysis—Selected Topics** (3)
Analysis of U.S. foreign policy toward selected world regions.

267 **Seminar: U.S. Foreign Policy** (3)
Research and selected reading as the basis for an analysis of the foreign policy of the United States, with particular reference to the decision-making process and the execution of policy.

288 **Seminar: Soviet Military Policy and Strategy** (3)
Soviet developments in military policy and strategy with attention to intra-

bloc military cooperation, political context of Soviet military policy, significant changes in recent Soviet military thought.

Psychology

Chairman: R.D. Walk, Professor of Psychology; GG-211, Telephone 676-6320

Departmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses in Psychology. Six semester hours in Psychology courses are prerequisite to Psychology courses numbered above 100. The departmental prerequisite may be waived with the permission of the instructor.

1 **General Psychology** (3)

Fundamental principles underlying human behavior.

8 **Psychology of Motivation and Personality** (3)

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized.

22 **Introduction to Educational Psychology** (3)

The contributions of psychology to education; emphasis on learning.

29 **Psychology of Childhood** (3)

Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world.

101 **Abnormal Psychology** (3)

Causes, diagnosis, treatment, and prevention of various types of maladjustments and mental disorders. Prerequisite: 6 semester hours in psychology, or 3 in psychology and 6 in a biological science.

112 **Psychology of Adolescence** (3)

Psychological characteristics and problems peculiar to adolescence, with emphasis on applications of psychology to solution of such problems.

121 **Psychology of Learning** (3)

Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects.

129 **Theories of Personality** (3)

Survey of personality theories; emphasis on their application to problems of individuals.

131 **Psychological Tests** (3)

Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7.

144 **Personnel and Industrial Psychology** (3)

Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation, and productivity.

145 **Psychology of Management** (3)

Psychological aspects of managing work organizations. Departmental prerequisite waived.

146 **Psychotechnology of Learning and Training** (3)

Psychological principles, concepts, and techniques of human learning and behavioral modification as applied to the design and operation of training and development systems.

151 **Social Psychology** (3)

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war.

156 **Psychology of Attitudes and Public Opinion** (3)

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare.

175 **Career Development in Youth and Maturity** (3)

Emphasis on the development of long-range career objectives based on review of experiences, the results of psychological testing, seminar discussion groups, and guided independent study. Analysis and practice of the specific skills needed to negotiate for advancement or to accomplish a career change.

191 **Independent Research in Psychology** (3) (Campus Course)

Individual study and research for those desiring to graduate with honors or to pursue more specialized topics. Arrangements must be made with the Department of Psychology.

211 **Assessment of Cognitive Functioning** (3)

Concepts of intelligence and achievement and their assessment through a variety of group and individual procedures. Emphasis on evaluation of children. Material fee, $7. Admission by permission of instructor.

246 **Seminar: Personnel Measurement Techniques** (3)

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, and performance ratings.

Public Administration

airman: M.M. Harmon, Associate Professor of Management; Government 302, lephone 676-6295

210 **Concepts and Issues in Public Administration** (3)

An introduction to graduate study in public administration. Professionalism and the public service. Nature of public interest; multiplicity of organizational objectives. Administrative responsibility and individual and organizational ethics. Individual goals and career planning.

213 Administration in the Federal Government (3)

Critical analysis of federal administrative organizations as an integral part of the political system. Roles of Congress, the President, the courts, interest groups, political parties, and the public in the public decisional process. Special attention to centripetal and centrifugal forces.

214 Policy Analysis in Public Administration (3)

Introduction to systematic analysis of public policy alternatives. Development of conceptual frameworks for differentiating types of public policies, e.g., distributive, regulatory, redistributive; examination of the contribution of economic, quantitative, and research techniques to the development, administration, and evaluation of these policies.

223 Behavioral Factors in Large Organizations (3)

Analysis of the nature and characteristics of large organizations. Bureaucracies and their behavioral patterns; dysfunctionalism. Approaches to policy guidance and leadership, particularly in large public organizations; influence and control systems. Future trends.

231 Public Personnel Administration (3)

Survey of basic principles and functions of personnel administration in the public service. Roles of personnel management, recruitment, placement, wage and salary administration, training, retirement, and other personnel functions.

232 Problems in Public Personnel Management (3)

Analysis and evaluation of major personnel management problems in government; employee-management relations; interagency and intergovernmental relationships. Impact of automation. Evaluation of personnel systems.

233 Seminar: Manpower Development and Utilization (3)

Examination of public and private manpower trends, problems, policies, and programs. Exploration of approaches, old and new, to manpower development and utilization. Analysis of impact of economic, political, and social factors on manpower. Students will select a specific area for individual investigation.

235 Technology Change and Professional Human Resource Planning (3)
(Formerly Technological Change and Manpower)

Research, discussion, and readings dealing with manpower problems arising from automation and other technological changes. Evaluation of these developments in government and business; their implications for productivity, employment, training and education, and personnel and industrial relations. Analysis of economic, political, and social factors influencing public and private manpower policies.

236 Labor-Management Relations in the Public Sector (3)

Principles and current issues in public sector labor relations; collective bargaining and the merit concept; scope of bargaining; representation elections; unfair practices; grievance procedures; bilateralism and the management process.

245 Intergovernmental Relations (3)

Assessment of the impacts and consequences of changes in the administration of intergovernmental policies and programs in the federal system. Legislation, roles, and responsibilities of federal, state, regional, and local

systems will be examined from both theoretical and practical vantage points to understand their effects.

248 **Financing Local Government** (3)

Analysis of the structure and administration of public finance in local governments. Includes the financing of services through municipal taxation and other revenue sources, debt administration, and implications of the budgetary process.

249 **Urban Public Policy** (3)

Examination of views of the city. Emphasis on urban systems in their social, political, economic, and physical aspects. Against the background of urban politics and administration, will address such central functional areas as health, education, welfare, crime, poverty, transportation, and housing.

250 **Administration of State and Local Governments** (3)

Examination of state and local governmental structures and functions, public and private demands, their place within the federal system, their limitations, and alternatives available to encourage more effective administration.

251 **Governmental Budgeting** (3)

Survey of the basic concepts, principles, and practices in governmental budgeting interrelationship of planning, programming, and budgeting; their role in the management process.

252 **Public Expenditure Analysis and Planning** (3)

Intensive analysis of managerial and economic procedures and techniques used by government agencies for planning, allocating, and managing scarce resources in the achievement of public programs. Topics discussed include benefit-cost analysis, program budgeting, systems analysis, present value analysis, and government contracting.

260 **Policy Formulation and Administration** (3)

Analysis in depth of factors and processes involved in policy development with particular attention to selected areas of national policy; development of agency goals and objectives.

262 **Seminar: Science, Technology, and Public Policy** (3)

The impact of science and technology upon public administration in terms of both administrative practice and national policies.

295 **Research Methods** (3)

Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings.

299 **Thesis Seminar** (3) (Campus Course)

Examination of thesis standards, research philosophy and methodology in public administration.

300 **Thesis Research** (3)

Religion

hairman: R.G. Jones, Professor of Religion; O-102, Telephone 676-6325

9 The Hebrew Scriptures (3)

Historical and literary study of the Hebrew Scriptures with consideration of development of religious ideas, institutions, and outstanding personalities.

10 The New Testament (3)

Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles.

21 Religion and Man's Search for Meaning (3)

Traditional religious concepts, language of contemporary religion amidst modern scientific and secular intellectual tendencies, and the place of religion in today's society.

22 Religion and Contemporary Social Issues (3)

Illumination of social problems by ethical reflection; examination of ethical perspectives as stimuli and barriers to social change; techniques for maintaining social values and seeking change.

59–60 History of Religions (3–3)

Origins, evolution, and contemporary status in historical context. Rel 59: primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam).

127 Medicine, Religion, and Healing (1) (Campus Course)

Total care concept. Importance of religion in medical practice for patient and physician. Concept of the professional man, the clergy's role in healing, religious perspective on issues in medical ethics.

216 Supervised Clinical Pastoral Education (I-A) (6)

Full-time program of clinical pastoral education in an approved center. Involvement in the responsibility for pastoral ministry is reviewed and evaluated in a peer-group context.

217 Supervised Clinical Pastoral Education (I-B) (6)

A continuation of Rel 216 with emphasis on pastoral and personal identity, sustained pastoral relationships, and pastoral methods and skills.

218 Supervised Clinical Pastoral Education (III-A) (6)

Responsibility in pastoral ministry is increased with emphasis on group work, interprofessional involvement, use of specific counseling methods, work with persons with special problems. Prerequisite: Rel 216 and 217; or equivalent.

219 Supervised Clinical Pastoral Education (III-B) (6)

Continuation of Rel 218 with emphasis on examination and review of administrative procedures, design of pastoral programs, and development of a pastoral theology.

222 Seminar: Christian Ethics (3) (Campus Course)

Important tendencies in ethical reflection of the contemporary Christian Church; contributions of social sciences to that reflection.

223 **Religious and Ethical Perspectives on Medical Problems** (3)

Religious and ethical questions in medical problems and medically related issues.

225 **The Dynamics of Ministering to the Young Adult** (3)

Conceptual models of development of young adults from late adolescence; special problems of educational and military experience, vocational choice, marriage and the family, and physical, intellectual, emotional, and religious development. Encounter experience with persons and groups.

227–28 **Advanced Studies in Pastoral Care** (3–3)

History and present state of methodologies and conceptual models of pastoral counseling and leadership in groups; supervised work in interfaith and multidisciplinary ministries.

235 **Seminar: Roman Catholicism in the Modern World** (3) (Campus Course)

Important leaders and their ideas in selected developments since 1500—doctrinal, spiritual, biblical, liturgical, and ecumenical.

237 **Seminar: Theological Analysis** (3) (Campus Course)

Historical and topical study of the development of important ideas in such areas as Christology, soteriology, and ecclesiology.

299–300 **Thesis Research** (3–3) (Campus Course)

Slavic Languages and Literatures

Chairman: G.A. Olkhovsky, Associate Professor of Russian; Library 627, Telephone 576-6335

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Russian** (3–3) (Campus Course)

Beginners' course in fundamentals of grammar and pronunciation. Prerequisite to Slav 2: Slav 1. Laboratory fee, $17.50 a semester.

3–4 **Second-year Russian** (3–3) (Campus Course)

Intermediate course in Russian language. Prerequisite to Slav 3: Slav 1–2 or two years of high school Russian. Prerequisite to Slav 4: Slav 3. Laboratory fee, $17.50 a semester.

9–10 **Intermediate Russian Conversation and Composition** (3–3) (Campus Course)

Listening comprehension; oral and written practice. Prerequisite: Slav 4 or 6, or permission of instructor.

91–92 **Introduction to Russian Literature** (3–3)

Emergence and development of Russian literature and ideas during the 19th and early 20th centuries—in English.

109–10 Advanced Russian Conversation and Composition (3–3)
Developing proficiency in oral and written expression. Prerequisite: Slav 10 or equivalent.

161–62 Russian Culture (3–3)
Survey of Russian cultural heritage from origins of ancient Russia to present—in English. Lectures, discussion, reports.

165 Soviet Literature from the Revolution to World War II (3)
Basic themes, issues, literary figures of the Soviet 1920s. The fate of literature and writers under increasing state control; Five-year Plan literature. Lecture, discussion, reports—in English.

166 Soviet Literature from World War II to the Present (3)
Literature in wartime, under Stalinism, and in the "thaws." The new generation of dissident liberals and "underground" literature. Lecture, discussion, reports—in English.

Sociology

Chairman: T.F. Courtless, Jr., Professor of Sociology; D-201, Telephone 676-6345

Departmental prerequisite: Soc 1 is prerequisite to all other courses in Sociology numbered below 200 except for Soc 191.

1 Introductory Sociology (3)
General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior.

2 Major Social Issues (3)
(Formerly Uses of Sociology)
Critical examination of selected major social issues confronting American society. Topics change each semester. May be repeated once for credit. Prerequisite: Soc 1.

101 Development of Social Thought (3)
Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century.

110 The Sociology of Work (3)
Introductory survey of industrial sociology; sociology of occupations and professions; industry-community relations; and analysis of large, complex organizations.

124 Medical Sociology (3)
Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services.

126 Urban Sociology (3)
Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development.

127 Population Problems (3)
Composition of populations, trends in population growth and population

pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control.

129 Race and Minority Groups (3)

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice.

130 Class, Status, and Power (3)

Analysis of distribution of resources and opportunities for participation, education, and social mobility in American society; international comparison; analysis of public policies which affect these distributions.

132 Political Sociology (3)

Analysis of problems involved in the study of power relations in society; distribution of power in society; types and processes of government; political participation and political mobilization.

134 Marriage and the Family (3)

Courtship as a social process, marriage and marital adjustment, development of the family, parent-child relations, family problems, disorganization, divorce, and family reorganization.

135 Juvenile Delinquency (3)

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders.

136 Criminology (3)

Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions in urban society.

137 Sociology of Law (3)

Law as a social phenomenon and agency of social control. Problems of legal concepts, doctrines, and institution.

139 Society and the Deviant (3)

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools.

140–41 Social Research Methods (3–3)
(Formerly Soc 141 [3])

Soc 140: introduction to basic research methods in sociology. Soc 141: advanced research methods. Prerequisite to Soc 141: Soc 140.

143 Social Movements (3)

General survey of the various forms of collective behavior (fads, panics, riots, social movements, etc.), and a more detailed study of the genesis, development, and decay of social movements and social revolutions.

144 Public Opinion and Mass Communication (3)

Communication process with emphasis on international communications, propaganda, and mass media; measurement of propaganda campaigns.

149 Modern Sociological Theory (3)

Systematic study of contemporary schools of sociological theory, both

European and American development; evaluation of scientific contributions of each school. Prerequisite: Soc 101.

191 **Current Emphases in Sociology** (3)

Analysis and evaluation of recent developments in the general field of sociology. Topic changes each semester; may be repeated for credit.

201 **Concepts of Sociology** (3)

Systematic survey, critical analysis of sociological concepts. Emphasis on theoretical systems.

210 **Theoretical Foundations of Political Sociology** (3)

Sociological theory on the relationship of politics to the wider social system. Emphasis on concepts of power, alienation, ideology, political stability, conflict, and change.

211 **Seminar: Social Change** (3)

Comparative study of political processes concentrating on political development in Third World Nations.

228 **Introduction to Urban Social Problems** (3)
(*Formerly Seminar: Urban Social Problems*)

Analysis of urban social theories and paradigms used in urban analysis; historical development of urban centers, including growth, development and change in society's perceptions of problems; examinations of legislative changes and policy making as they apply to urban areas.

248 **Seminar: Organizational Theory and Behavior** (3)

Advanced analysis of theory and behavior in complex organizations relative to defining organizations, examining basic social processes and their relationship to the cultural environment.

263 **Seminar: Law and Society** (3)

Selected problems in law as an instrument of social policy; emphasis on the organization of legal decision-making processes.

270 **Educational Sociology** (3)

Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components.

271 **Sociology of the Youthful Offender** (3)

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders.

272 **Social Disorganization** (3)

Analysis of factors contributing to disruption of social groups, institutions, and communities; study of attempts to establish social controls to prevent, minimize, or mitigate the effects of socially disruptive conditions and events.

273 **Deviant Behavior** (3)

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools.

274 **Human Sexuality** (3)

A synthesis of theoretical perspectives from which analysis of various forms of sexual behavior and problems related to sexuality will be undertaken.

Spanish*

Chairman: J.F. Burks, Professor of French; Monroe 429, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Spanish** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year Spanish** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Span 4. Conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Prerequisite: Span 1–2, or two years of high school Spanish. Laboratory fee, $17.50 a semester.

Special Education

Chairman: P. Botwin, Professor of Special Education; C-429, Telephone 676-6170

170 **Interpersonal/Intrapersonal Relationships for Special Education Teachers** (3)

Consideration of factors leading to successful interaction with children.

200 **Understanding Young Exceptional Children** (3)

Lecture and field experience. Application of the basic concepts of early child development as applied to special education.

201 **Introduction to Special Education** (3)

Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accommodate children in a school program.

222 **Special Education in the Regular Classroom** (3)

Special techniques and materials for regular classroom teachers to assist children who have learning and/or behavior problems; emphasis on specific, practical strategies and applications. Open to undergraduate seniors and regular class teachers.

*Administered by the Department of Romance Languages and Literatures.

240 **The Crisis-Resource Teacher** (3)

Rationales, operational models, techniques, and problems relevant to the implementation of crisis-resource teacher programs.

241 **Practicum in Crisis-Resource Teaching** (6)

(Formerly Preprofessional Internship: Crisis-Resource Teaching)

Practicum experience early in the training sequence in crisis-resource teaching. Under the direction of qualified teachers in a field setting. A minimum of 280 clock hours required.

242 **Specialized Techniques and Materials for Crisis-Resource Teachers** (3)

Lectures, discussions, techniques, and selected materials exploring the psycho-educational factors used in crisis-resource teaching. Admission by permission of instructor.

250 **Specialized Techniques and Materials for Diagnostic-Prescriptive Teachers** (3)

Selected materials and techniques used in diagnostic-prescriptive teaching. Must be taken concurrently with SpEd 252. Admission by permission of instructor.

251 **Psychosocial Factors in Special Education** (3)

Psychosocial factors significant to the process of the special education school-based consultant. Admission by permission of instructor.

252 **Practicum for Diagnostic-Prescriptive Teachers** (6)

(Formerly Preprofessional Internship for Diagnostic-Prescriptive Teachers)

Supervised school experience in diagnostic-prescriptive teaching. Must be taken concurrently with SpEd 250. Admission by permission of instructor. A minimum of 280 clock hours required.

253 **The Humanizing Curriculum and the Special Education Consultant** (3)

Curriculum concepts and modification aimed at enhancing the classroom environment for learning and growth. Admission by permission of instructor.

260 **The Assessment Process: Identification and Psycho-educational Assessment of Young Exceptional Children** (3)

Lectures, demonstrations, and clinical practice in formal and informal assessment procedures. Admission by permission of instructor.

261 **Practicum: Methods and Materials for Young Exceptional Children** (3)

(Formerly The Teaching/Learning Process: Methods and Materials for Young Exceptional Children)

Clinical practice in the designing of educational strategies and materials: taught in a special education setting. Admission by permission of instructor.

262 **Seminar: the Education of Young Exceptional Children** (3)

Weekly seminar dealing with experiences, problems, and concerns encountered during the internship for the education of young exceptional children. Must be taken concurrently with SpEd 292. Admission by permission of instructor.

263 **Introduction to the Education of the Severely and Multiply Handicapped** (3)

Survey of the characteristics and learning patterns of children with severe disabilities. Lecture and field experience.

264 **Advanced Study in the Special Education of Severely and Multiply Handicapped Children** (3)

Specialized programs, techniques, and methods for teaching children with severe disabilities.

266 **Problems in Language Development in Exceptional Children** (3)

Introduction to the study of language acquisition and the application of current research on language of handicapped children.

267 **The Role of the Early Childhood Special Educator** (3)

Examination of the spectrum of roles available in early childhood special education; emphasis on role expectations and psychosocial dynamics of the various settings.

268 **The Development of Young Exceptional Children with Emphasis on Handicapping Conditions** (3)

Lecture (2 hours), site visitation (3 hours), discussion (2 hours).

269 **Psychosocial Concerns of the Early Childhood Special Educator** (3)

Seminar involving student presentations focusing on sociological and psychological constructs relevant to interpersonal/intrapersonal relationships.

270 **Adapting the Early Childhood Curriculum to Meet Special Needs** (3)

Review of the basic curriculum areas as they relate to the development of readiness skills in special education.

291 **Internship in Crisis-Resource Teaching** (9)
(Formerly Practicum in Crisis-Resource Teaching)

Supervised field experience in the crisis-resource teacher program. Under the direction of a qualified teacher and the supervision of the University staff. Minimum of 420 clock hours required.

292 **Professional Internship in Education of Young Exceptional Children** (9)

Supervised internship in the education of young exceptional children. A minimum of 420 clock hours required. Must be taken concurrently with SpEd 262.

294 **Internship in Diagnostic-Prescriptive Teaching** (9)
(Formerly Practicum in Diagnostic-Prescriptive Teaching)

Supervised field experience in diagnostic-prescriptive teacher programs. A minimum of 420 clock hours required. Admission by permission of instructor.

303 **Administration and Supervision of Special Education** (3)

Philosophy and nature of special education; litigation, program organization, administration, and development. Surveying local-level needs; program evaluation and supervision. Admission by permission of instructor.

306 **Dynamics of Family Intervention: Theory and Practice in Special Education** (3)
(Formerly The Design of Family Education Programs: Theory and Practice)
Theoretical foundations and clinical practice in working with parents and community agencies in meeting the educational needs of young exceptional children.

350 **The Diagnostic-Prescriptive Teacher** (3)
Rationale, operational models, techniques, and problems relevant to implementation of diagnostic-prescriptive teacher programs. Admission by permission of instructor.

351 **Seminar: School-based Consultants in Special Education** (3)
Current practices in regular and special education as they affect the school-based consultant; emphasis on concurrent field experience. Admission by permission of instructor.

352 **Seminar: Special Education Consultant Programs in the Schools** (3)
For school-based consultants in special education; focuses on in-school program development and recent trends in processes and procedures. Admission by permission of instructor.

370 **Intrapersonal Dynamics in Special Education** (3)
Small group exploration of intrapersonal factors essential to understanding roles and interpersonal techniques in teaching exceptional children. Admission by permission of instructor.

Speech and Drama

Chairman: L.S. Bowling, Professor of Speech and Hearing, Auditorium 6, Telephone 676-6350

1 **Communicative Speaking and Listening** (3)
Basic theories and principles of speech communication; composition, delivery, and criticisms of speaking in interpersonal, group, and public situations. Recording fee, $4.

11 **Voice and Diction** (3)
Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4.

32 **Oral Interpretation of Literature** (3)
Theory and practice in discovering and communicating orally the meaning in literature through analysis of form and content. Techniques of reading prose, poetry, and drama for listeners. Prerequisite: SPDR 11. Recording fee, $2.

45 **Understanding the Theatre** (3)
The art of the theatre: its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through

lectures, visiting artists, class discussions, and attendance at theatrical performances. Primarily for nonmajors.

91 **Parliamentary Procedure and Group Participation** (3)

Principles and procedures for effective speech communication to function successfully at various levels of responsibility in academic, social, professional, civic, or business organizations. Prerequisite: SPDR 1 or 11, or permission of instructor.

*111 **Business and Professional Speaking** (3)

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors.

121 **Group Discussion and Conference Leadership** (3)

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: SPDR 1 or permission of instructor.

Statistics

Chairman: J. Cornfield, Professor of Statistics; C-311, Telephone 676-6356

Departmental prerequisite: One entrance unit in algebra is prerequisite to courses in Statistics numbered below 100.

††51 **Introduction to Business and Economic Statistics** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18.

‡53 **Introduction to Statistics in Social Science** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests by hypotheses, correlation, analysis of variance. Laboratory fee, $18.

‡101–2 **Basic Principles of Statistical Methods** (3–3)

Variables and attributes, averages and dispersion, elementary principles of sampling, introduction to the making of statistical decisions. Prerequisite to Stat 102: Stat 101.

105 **Statistics in the Behavioral Sciences and Education** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Advanced study of statistical techniques for research problems. Analysis of variance, correlation techniques, nonparametric techniques, sampling theory. Prerequisite: Stat 53 or equivalent and satisfactory performance on a placement examination. Laboratory fee, $18.

his course can be adapted to the needs of a specific group.
at 101, which is offered off campus, may be substituted.
at 51, 53, and 101 are related in their subject matter, and credit hours for only one of the e may be applied toward a degree.

107 **Statistics for Engineers** (3)

Probability models, discrete and continuous distributions, sampling, hypothesis testing and estimation, engineering applications. Prerequisite: differential and integral calculus.

111 **Business and Economic Statistics I** (3) (Campus Course)

Statistical processes as tools in decision-making in areas of economics and business.

112 **Business and Economic Statistics II** (3) (Campus Course)

Case work to illustrate quantitative procedures for solution of economic and business problems. Prerequisite: Stat 111 or equivalent.

225 **Introduction to Biostatistics** (3)

Probability models, inference, and study design as applied to biomedical investigations. Prerequisite: Stat 201.

Telecommunication Operations

Faculty Adviser: D.A. Rowley, Associate Professor of Chemistry; Bacon 201, Telephone 676-6210

240 **Seminar in Telecommunication Policy and Regulations** (3)

International and domestic telecommunications institutions; the policy and regulatory process; spectrum management; cable telecommunications systems; common carrier/microwave transmissions system; mobile system; broadcasting-AM, FM, UHF, VHF-TV; satellites; United States domestic satellites; mobile satellite system; international telecommunications law; environmental impact; United States government systems; INTELSAT.

APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of The George Washington University as soon after order is restored as is practicably possible.

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*The University Senate has been renamed the Faculty Senate.

†The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

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* Amended January 18, 1973.

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

*The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

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COLLEGES AND SCHOOLS—DEGREE PROGRAMS

COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.F.S.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S.F.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.), Bachelor of Science (B.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), Doctor of Science (D.Sc.), Engineer (Engr.), and Applied Scientist (App.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelor of Science in Human Kinetics and Leisure Studies (B.S. in H.K.L.S.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Master of Arts (M.A.), and Master of Science in International Affairs (M.S.I.A.)

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THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

THE DIVISION OF EXPERIMENTAL PROGRAMS, 1973



DOES NOT
CIRCULATE